10 subsamples. Inspection of this table reveals that no item had a difficulty below the chance value (50%) for all samples, but one (# 14) had a value below 50% for five samples and one (# 15) such a value for six samples. No item correlated negatively with the total test score for more than three samples. Without presentation of detailed discussion of these and related findings for each item with respect to each subsample, the investigators commit themselves to careful inspection of these data in undertaking the next revision of the test.

Before this task has been accomplished, however, the reader may find some interest in the correlations among the item difficulty values and among the item-test correlation coefficients for the several subsamples. These are presented in Tables 4.7 and 4.8, respectively. Although certain groupings of the subsamples--whether on religious, racial, ethnic, socioeconomic, or a rural-urban dimension or a confusing concatenation of these influences may still depend upon one's biases--will be apparent from the foregoing tables, a more systematic approach is available via the route of factor analysis. Accordingly, the two matrices based upon correlations among difficulty indices and among item-test point-biserial correlation coefficients were each factor-analyzed to three factors by a principal-axes solution with orthogonal rotation.

Table 4.9 presents the orthogonally rotated loadings for the factors based upon item difficulty indices. Recall that the subsamples are listed in order of total mean score on the test, from high to low. The highest loading for each subsample was first identified. Factor 1 was then found to be associated with subgroups (in order of magnitude

TABLE 4.7

Correlations (Pearson r's) Among Difficulty Indices of Gumpgookies Items for Ten Subsamples

| | Mormon (N=225) | Catholic (N=200) | Jewish (N=197) | Puerto Rican (N=90) | Negro (Urban) (N=202) | White (Rural) (N=36) | Hawaiian (N=47) | Oriental (W.C.) (N=39) | Mex.-American (N=114) | Am. Indian (N=234) |
|---|---|---|---|---|---|---|---|---|---|---|
| Mormon (N=225) | -- | .77 | .77 | .72 | .72 | .67 | .48 | .39 | .62 | .62 |
| Catholic (N=200) | .77 | -- | .87 | .88 | .70 | .74 | .47 | .55 | .77 | .68 |
| Jewish (N=197) | .77 | .87 | -- | .78 | .71 | .71 | .47 | .51 | .66 | .63 |
| Puerto Rican (N=90) | .72 | .88 | .78 | -- | .65 | .68 | .46 | .49 | .82 | .73 |
| Negro (Urban) (N=202) | .72 | .70 | .71 | .65 | -- | .68 | .53 | .47 | .63 | .53 |
| White (Rural) (N=36) | .67 | .74 | .71 | .68 | .68 | -- | .45 | .43 | .65 | .59 |
| Hawaiian (N=47) | .48 | .47 | .47 | .46 | .53 | .45 | -- | .46 | .52 | .54 |
| Oriental (W.C.) (N=39) | .39 | .55 | .51 | .49 | .47 | .43 | .46 | -- | .53 | .59 |
| Mex.-American (N=114) | .62 | .77 | .66 | .82 | .63 | .65 | .52 | .53 | -- | .73 |
| Am. Indian (N=234) | .62 | .68 | .63 | .73 | .53 | .59 | .54 | .59 | .73 | -- |

## TABLE 4.8

### Correlations (Pearson r's) Among Gumpgookies
### Item-Test Correlation Coefficients for Ten Subsamples

| | Mormon (N=225) | Catholic (N=200) | Jewish (N=197) | Puerto Rican (N=90) | Negro (Urban) (N=202) | White (Rural) (N=36) | Hawaiian (N=47) | Oriental (W.C.) (N=39) | Mex.-American (N=114) | Am. Indian (N=234) |
|---|---|---|---|---|---|---|---|---|---|---|
| Mormon (N=225) | -- | .57 | .57 | .26 | .34 | .39 | .26 | .24 | .21 | .40 |
| Catholic (N=200) | .57 | -- | .66 | .50 | .49 | .54 | .44 | .31 | .35 | .40 |
| Jewish (N=197) | .57 | .66 | -- | .44 | .47 | .50 | .29 | .26 | .36 | .41 |
| Puerto Rican (N=90) | .26 | .50 | .44 | -- | .33 | .31 | .23 | .36 | .52 | .46 |
| Negro (Urban) (N=202) | .34 | .49 | .47 | .33 | -- | .30 | .41 | .32 | .27 | .23 |
| White (Rural) (N=36) | .39 | .54 | .50 | .31 | .30 | -- | .33 | .14 | .26 | .33 |
| Hawaiian (N=47) | .26 | .44 | .29 | .23 | .41 | .33 | -- | .28 | .32 | .42 |
| Oriental (W.C.) (N=39) | .24 | .31 | .26 | .36 | .32 | .14 | .28 | -- | .23 | .28 |
| Mex.-American (N=114) | .21 | .35 | .36 | .52 | .27 | .26 | .32 | .23 | -- | .44 |
| Am. Indian (N=234) | .40 | .40 | .41 | .46 | .23 | .33 | .42 | .28 | .44 | -- |

### TABLE 4.9

### Orthogonally Transformed Factor Loadings Based Upon Factor Analysis of the Item Difficulty Values for Ten Subsamples (75-Item Form of _Gumpgookies_)

| | Factors * | | |
|---|---|---|---|
| | 1 | 2 | 3 |
| 1. Mormon | 83 | 18 | 27 |
| 2. Catholic | 82 | 47 | 10 |
| 3. Jewish | 82 | 34 | 18 |
| 4. Puerto Rican | 76 | 54 | 04 |
| 5. Negro (Urban) | 74 | 16 | 46 |
| 6. White (Rural) | 78 | 25 | 23 |
| 7. Hawaiian | 25 | 32 | 86 |
| 8. Oriental (West Coast) | 15 | 80 | 33 |
| 9. Mexican-American | 61 | 62 | 14 |
| 10. American Indian | 46 | 73 | 21 |

*Decimal points have been omitted.

of factor loadings) 1, 2, 3, 6, 4, 5 (Mormon, Jewish, Catholic, White-rural, Negro-urban, and Puerto Rican-urban). Factor 2 was associated with groups 8, 9, and 10 (Oriental West Coast, American Indian, and Mexican-American). However, the loading for the Mexican-American group was almost as high for factor 1 as for factor 2. The Hawaiians (group 7) stood alone on factor 3.

In the factor analysis of the relationships among the item-test correlation coefficients for the various groups (Table 4.10), factor 1 is associated, in order, with subsamples 3, 1, 2, and 6 (Jewish, Mormon, Catholic, and White-rural). Factor 2 is associated, in order, with Mexican-American, Puerto Rican, and American-Indian subsamples. Factor 3 has its highest loadings, in order, for the Oriental West Coast, urban Negro and Hawaiian children in the subsamples.

Different readers may be tempted to speculate at length, and to different ends, about the foregoing results. One can scarcely escape the finding that groups identified as Jews, Catholics, Mormons, and rural Whites are found on both a common difficulty and a common item-test correlation factor. Mexican-Americans and American Indians go together on a factor in each of the analyses. Puerto Ricans appear on the same item-correlation factor; but, although they have a high loading on the same factor for item difficulty, they have a still higher loading on factor 1. The urban Negroes, joining the Mormons, Catholics, Jews, rural Whites and Puerto Ricans on the first item-difficulty factor, go with the Oriental West-Coasters and Hawaiians on the third item-difficulty factor.

No definite conclusions as to subsample differences as reflected in these analyses are here advanced. Various combinations of differences

## TABLE 4.10

Orthogonally Transformed Factor Loadings Based Upon Factor Analysis of the Item-Test Correlation Coefficients for Ten Subsamples (75-Item Form of Gumpgookies)

| | Factors * | | |
|---|---|---|---|
| | 1 | 2 | 3 |
| 1. Mormon | 76 | 08 | 18 |
| 2. Catholic | 74 | 28 | 33 |
| 3. Jewish | 77 | 26 | 21 |
| 4. Puerto Rican | 22 | 72 | 26 |
| 5. Negro (Urban) | 43 | 06 | 66 |
| 6. White (Rural) | 73 | 25 | -01 |
| 7. Hawaiian | 27 | 32 | 49 |
| 8. Oriental (West Coast) | 00 | 20 | 82 |
| 9. Mexican-American | 11 | 83 | 12 |
| 10. American Indian | 31 | 69 | 14 |

*Decimal points have been omitted.

in socioeconomic levels, religious backgrounds, ethnic effects, cultural influences, and bilingualism versus monolingualism in the home might be brought forth as explanatory hypotheses. Some may even suspect the hodge-podge popularly referred to as the "white, middle-class" background of the perpetrators of the Gumpgookies test.

Nonetheless, if members of subsamples who do less well on the test aspire to what they perceive as advantages of subsamples who do better on the test--in whatever guise--then measurement of motivation to achieve and investigation of means of increasing it should be palatable.

# CHAPTER 5

# DATA PERTAINING TO THE VALIDITY AND RELIABILITY OF GUMPGOOKIES

## Relation of Gumpgookies to External Criterion Measures

In addition to study of the internal validity of Gumpgookies by means of factor analytical techniques, as described in Chapter 6, several attempts have been made to relate the Gumpgookies test to other independent measures of motivation to achieve and related behaviors.

The first effort involved a specific arranged task on the performance of which two observers each rated the children on seven hypothesized motivational dimensions. The task consisted of putting together a puzzle during a 15-minute period. The children were each handed a puzzle but worked at a table with two to five others. The teacher took charge of the group, framing questions and allowing the children also to ask questions. She was available for help and worked with children who were experiencing consistent failure. Specific instructions were given as to what she could say. She was instructed to praise or encourage each child approximately three times during the session. Easier puzzles were available for the child who found the first puzzle too difficult and more complicated ones for the child who finished early. After 12 minutes, each child was given the option of going out to play or finishing his puzzle.

The observers watched for signs of and rated behavior representing the following characteristics:

1. eagerness to begin
2. inattention

3. seeking or responding to praise and showing signs of pride
4. accepting or seeking help, or not needing it
5. comments of interest or curiosity questions
6. carefulness
7. persistence

Rating was done in three five-minute intervals. Eagerness to begin and persistence were rated on a scale, while evidence of other dimensions was recorded each time upon occurrence. After the observation, these characteristics were assigned ratings depending on number of occurrences. The three ratings for each characteristic were averaged over the 15 minutes, and each subject was given a total score.

The Pearson _r_ between the motivation ratings assigned by the two raters during the puzzle task (inter-rater reliability) was .83 (N = 13). The Pearson _r_ between the average ratings assigned by the two raters and the _Gumpgookies_ scores was .28 (N = 13), not significant at the .05 level. Although the ratings were apparently reliable, the behavior observed may have related to factors other than motivation. One weakness that had been anticipated was that the task used may have resulted in behavior that was too situation-specific or too time-specific. Thus a particular child's behavior may have varied from day to day or from one problem to another. Part of the difficulty, also, seemed to be attributable to the interaction of the teacher with particular children. She gave certain children much more attention, prodding some more than others. Therefore, some children were encouraged more than others to ask questions, seek help, verbalize, and persist on the task, thereby receiving higher ratings. The teacher's behavior (i.e., enthusiasm) changed from day to day. In addition, limited spread of the scores on the test can contribute to a low correlation coefficient. When other criterion measures were deemed more satisfactory, this method was not further pursued. One suggestion, if the method were to be tried again, was to use a tape recorder or video tape to better assess behavior of the child and his interactions with the teacher.

Two different behavior rating scales were completed by two teachers within one classroom. The first was Zigler's Behavior Inventory, adapted by Project Head Start for use in 1966-67. The teachers rated each child on 50 items, using a four-point scale for each. Only 12 of these items (those deemed to be related to motivation) were analyzed. All were rated, however, with a view to obtaining more reliable and valid ratings of the factor seemingly related to motivation.

The regular classroom teacher's ratings yielded a rank-difference correlation of .48 (significant at the .05 level, N = 16) with the Gumpgookies scores. A motivation behavior rating scale composed by Ballif was also completed by the two teachers. The regular classroom teacher's motivation rankings correlated .58 with the Gumpgookies scores (significant at the .01 level). The part-time language teacher's rankings correlated .72 with Gumpgookies (significant at the .01 level). Both of these rating devices appeared to be good criterion measures. They were not used, however, as a still simpler method, perhaps ill-advisedly, in retrospect, was deemed feasible.

The same two teachers were asked to read a description of motivation and to rank the children with respect to motivation. The rankings made by the regular classroom teacher had a rank-difference correlation of .59 with Gumpgookies scores, significant at the .05 level. The rankings of the part-time language teacher correlated .22 with Gumpgookies (not significant). However, the rank-difference correlation between the two teachers' rankings, .62, was significant. Both teachers' rankings correlated with their ratings on the Zigler Behavior Inventory at a significant level. It was felt this ranking procedure would be a fairly simple and accurate measure to use as a criterion.

The written definition of motivation and instructions for ranking children were presented to 14 additional Head Start teachers. Motivation was described as something within a person that incites him to action or effort in certain directions. The idea that motivation is both an attitude and a process, including ways of feeling as well as ways of reacting, was explained. Motivation was differentiated from the concepts of achievement and aptitude. Finally, examples of the motivated child were included. Teachers were instructed to begin by listing the child showing the highest motivation, then the one with the lowest, next the second highest, then the second lowest, and so on.

Rank-difference correlation coefficients between the ranks on the test and the ranks assigned by the teacher were computed. On the basis of a standard table of critical values for this type of coefficient, five of the 14 coefficients were beyond the .05 significance level, and 12 of the 14 coefficients were positive. In view of the somewhat more promising results with the Zigler and Ballif scales, further work based on them is indicated.

The Gumpgookies scores of the three most highly motivated and the three least motivated children, as designated by the teacher's rankings on motivation, were analyzed separately by means of the median test. The rankings were completed by 10 teachers, yielding a sample of 60 children. A Gumpgookies score of 57 was the median. Of the 30 students ranked most highly on motivation, 17 were above the median, 10 below the median, and three at the median. Of the students ranked lowest in motivation, 10 were above the median, 19 below the median, and only one at the median. A chi-squared analysis of this breakdown yielded a value of 4.62, significant at the .05 level.

An analysis of variance computed on these same data yielded an F value of 13.07, significant at the .01 level (Table 5.1). A similar analysis with these data, plus data from five additional classes collected later in the year, yielded an F significant at the .05 level (Table 5.2).

Some additional data are available with the group form of the Gumpgookies for first-, second-, and fourth-graders. Each teacher was asked to rank the top 15% and the bottom 15% of her class with respect to motivation with the same instructions as had been used before. The differences in Gumpgookies scores between highest and lowest ranked children for each grade were subjected to analysis of variance procedures. These data are presented in Table 5.3. The difference for the first grade was significant at the .05 level; that for the second grade was also significant at the .05 level; and the difference for the fourth grade, while favoring the group ranked high on motivation, was not significant.

## Relation of Gumpgookies to the Children's Self-Concept Index

In the course of the development of Gumpgookies--and long after the format had been decided upon and the early editions of the test had been applied to a large number of subjects--the Children's Self-Concept Index came to the attention of the staff. This is an instrument adapted by the Westinghouse Learning Corporation from a test originally developed by Joseph H. Meyerowitz, who had been interested in an index of "self-derogation." The test was used in the National Impact Study

## TABLE 5.1

Analysis of Variance of *Gumpgookies* Scores for the Three Highest and Three Lowest Ranked Students on Motivation, for Ten Classes

| Group | High Motivation | Low Motivation |
|---|---|---|
| N | 30 | 30 |
| Mean | 62.20 | 54.70 |
| S. D. | 9.05 | 6.87 |

Table of Variances

| Source | Sums of Squares | D. F. | Mean Squares | *F* Ratio | p |
|---|---|---|---|---|---|
| Total | 4586.84 | 59 | | | |
| Between Groups | 843.75 | 1 | 843.75 | 13.07 | <.01 |
| Within Groups | 3743.09 | 58 | 64.54 | | |

## TABLE 5.2

Analysis of Variance of _Gumpgookies_ Scores for the Three Highest and Three Lowest Ranked Students on Motivation, for Fifteen Classes

| Group | High Motivation | Low Motivation |
|---|---|---|
| N | 45 | 45 |
| Mean | 62.62 | 53.87 |
| S. D. | 9.52 | 6.36 |

Table of Variances

| Source | Sums of Squares | D. F. | Mean Squares | _F_ Ratio | p |
|---|---|---|---|---|---|
| Total | 7492.61 | 89 | | | |
| Between Groups | 1724.84 | 1 | 1724.84 | 26.32 | <.01 |
| Within Groups | 5767.77 | 88 | 65.54 | | |

## TABLE 5.3

### Analyses of Variance of Gumpgookies Scores for the Fifteen Per Cent Highest and Fifteen Per Cent Lowest Ranked Students on Motivation

|  | First Grade |  | Second Grade |  | Fourth Grade |  |
|---|---|---|---|---|---|---|
| Group | High | Low | High | Low | High | Low |
| Mean | 84.40 | 75.68 | 87.27 | 81.00 | 82.03 | 80.24 |
| S. D. | 10.05 | 17.92 | 6.11 | 12.04 | 7.96 | 8.15 |
| N | 25 | 25 | 30 | 30 | 29 | 29 |

Sources of Variance

|  | First Grade | D. F. | Second Grade | D. F. | Fourth Grade | D. F. |
|---|---|---|---|---|---|---|
| Total S.S. | 11077.89 | 49 | 5874.92 | 59 | 3680.89 | 57 |
| Between Groups S.S. | 950.48 | 1 | 589.07 | 1 | 46.62 | 1 |
| Within Groups S.S. | 10127.41 | 48 | 5285.99 | 58 | 3634.27 | 56 |
| Between Groups M.S. | 950.48 |  | 589.07 |  | 46.62 |  |
| Within Groups M.S. | 210.99 |  | 91.14 |  | 64.90 |  |
| *F* Ratio | 4.50 |  | 6.46 |  | .72 |  |
| P Level | < .05 |  | < .05 |  | N.S. |  |

for Project Head Start conducted by Westinghouse. Its "internal consistency reliability" (KR-20?) has been reported to be .80, based on 100 second-grade pupils; test-retest reliability after two weeks was .66 (for the same sample?).

Each of 26 items contains a pair of "stick" figures, one a "balloon-child" and one a "flag-child." The balloon-child always appears in the left-hand position, and it is always described first.

Although the emphases of the items in this test and Gumpgookies do differ, there was sufficient similarity that a comparison of results of administering both tests to the same sample seemed worthwhile. In addition, the problem of right-left position preference (or primacy versus recency) had been encountered with the original format of Gumpgookies, in which the examiner uniformly described the left-hand figure first. Because of the format of the Self-Concept test, it was thought that the same problem might occur, even for second-grade children. The problem was regarded as not so likely to be evident as in the case of younger children, however. The test had been included in the Westinghouse study for groups of first-, second-, and third-graders.

The Self-Concept test and a 100-item, randomized form of Gumpgookies were administered to a sample of 104 children in the second grade in Hawaii schools in the spring of 1969. The correlation between the two tests was .43.

For full exploration of the question of position preference, it would have been desirable to set the items up for an individual form of the test to be administered to four-year-olds. Unfortunately, resources for the study did not permit the amount of work that this would have required.

It was possible, however, to factor the Self-Concept test. Two solutions were obtained, one with six factors and one with two factors. As had been found with factor analyses of other binary data covered in this report, the last eigenvalues exceeded unity; but, because of the difficulty of identifying as many as six factors with binary data and a small number of variables, no further solutions were obtained.

Both oblique and orthogonal rotations were obtained, the results for the two solutions being quite similar. Table 5.4 presents the obliquely rotated six-factor matrix, Table 5.5 the obliquely rotated two-factor matrix. In the two-factor solution, for which the majority of the items had their highest loadings on the first factor, there is little suggestion of position factors. In the six-factor solution, the five items with highest loadings on the second factor all have answers in the right-hand position. Thus, also, all of the answers indicate preference for the balloon-man, and all of the items had the correct answer presented last. For the first factor, seven of the highly loaded items had answers to the left, three to the right. The numbers of items for the other factors are too small to be indicative. For the two-factor solution, the highly loaded items on each factor are about equally divided between left and right. The results, while somewhat inconclusive, appear to indicate that if a position-preference problem is present, at least the test is measuring something else in addition when it is given to second-graders. From the results previously reported for the Gumpgookies test, a position preference problem, confounded with primacy and recency factors, very probably would be present were the Self-Concept test to be given to much younger children, say, three or four years of age, for whom the test would be

## TABLE 5.4

### Oblique (Oblimin) Factor Loading Matrix for a Six-Factor Solution for the Children's Self-Concept Index (104 Hawaiian Second-Grade Children, Spring, 1969)

| Item Number | Factor Loadings | | | | | |
|---|---|---|---|---|---|---|
| | I | II | III | IV | V | VI |
| 1 | -.08 | -.13 | -.01 | .43 | .05 | -.08 |
| 2 | .38 | .32 | .14 | .52 | .18 | .28 |
| 3 | .27 | .55 | .44 | -.34 | .32 | .15 |
| 4 | .20 | .26 | .21 | -.05 | .71 | .17 |
| 5 | .44 | .19 | .70 | -.03 | .08 | .12 |
| 6 | .69 | .23 | .28 | -.17 | .21 | .09 |
| 7 | .56 | .09 | -.22 | .24 | -.03 | .43 |
| 8 | .26 | .14 | .47 | -.11 | -.49 | .33 |
| 9 | .43 | .71 | .43 | .15 | -.13 | .35 |
| 10 | .78 | .14 | .41 | .06 | .03 | .32 |
| 11 | .25 | .13 | .22 | .00 | .00 | .80 |
| 12 | .10 | .60 | .21 | -.26 | .15 | -.16 |
| 13 | .47 | .47 | .36 | .04 | .00 | -.29 |
| 14 | .72 | .21 | .61 | .23 | .17 | .37 |
| 15 | .64 | .26 | .31 | .46 | -.24 | .53 |
| 16 | .58 | .17 | .54 | .06 | .30 | -.15 |
| 17 | .21 | .62 | -.02 | .23 | -.15 | .14 |
| 18 | .54 | .10 | .41 | .15 | .25 | .38 |
| 19 | .50 | .06 | .58 | -.46 | -.03 | .18 |
| 20 | .20 | .17 | .67 | .32 | .09 | .25 |
| 21 | .65 | .32 | .34 | -.22 | .12 | .00 |
| 22 | .58 | .22 | .45 | .55 | -.30 | .29 |
| 23 | .00 | .71 | -.03 | -.09 | .27 | -.06 |
| 24 | .32 | .11 | .36 | .21 | .63 | .07 |
| 25 | .47 | .09 | .80 | -.11 | .29 | .04 |
| 26 | .61 | .19 | .23 | .15 | -.03 | -.01 |

## TABLE 5.5

### Oblique (Oblimin) Factor Loading Matrix for a Two-Factor Solution for the Children's Self-Concept Index (104 Hawaiian Second-Grade Children, Spring, 1969)

| Item Number | Factor Loadings | |
|---|---|---|
| | I | II |
| 1 | .01 | -.19 |
| 2 | .43 | .11 |
| 3 | .27 | .69 |
| 4 | .22 | .47 |
| 5 | .56 | .34 |
| 6 | .55 | .37 |
| 7 | .42 | -.15 |
| 8 | .38 | .02 |
| 9 | .49 | .45 |
| 10 | .75 | .16 |
| 11 | .37 | -.01 |
| 12 | .04 | .64 |
| 13 | .39 | .49 |
| 14 | .81 | .25 |
| 15 | .71 | -.04 |
| 16 | .58 | .40 |
| 17 | .16 | .29 |
| 18 | .61 | .16 |
| 19 | .50 | .30 |
| 20 | .47 | .18 |
| 21 | .52 | .45 |
| 22 | .70 | -.04 |
| 23 | -.09 | .62 |
| 24 | .40 | .32 |
| 25 | .60 | .42 |
| 26 | .53 | .16 |

more difficult. Clearly, if a set of items is on the average as easy as this test was for the second-graders, factors extraneous to the content would be expected to play a very secondary role.

No attempt will be made here to interpret the factors in the Self-Concept test, except to note tentative interpretations of the factors in the two-factor solution. The first of these (which in the six-factor solution splits into three factors--the first, third, and reflected fourth) perhaps can be interpreted as related to self-confidence or a positive self-image. The second (which is similar to the second factor in the six-factor solution) may be related to social adjustment (or adjustments to other persons). Because of the small numbers of items on the second factor, this interpretation should be regarded as tenuous at best. Since some of the items in the Gumpgookies test attempt to measure similar factors, it is perhaps not surprising to find the correlation of .43 between the two tests.

The KR-20 reliability estimate for the Self-Concept test for the Hawaii sample was .87. Table 5.6 presents the difficulty values (percentage passing each item) and the item-test point-biserial correlation coefficients for the items of this test. The mean difficulty value is .91. Table 5.7 shows the frequency distribution. The mean score for the Hawaii second-graders on this 26-item test was 49.60. It is scored by crediting two points for an item correct and one point for an item missed. The possible range is thus 26 through 52 rather than 0 through 26. The mean reported in the Westinghouse study for a sample of 221 second-graders is 46.43, and for a sample of 48 third-graders it is only 46.83. Although both of these values are lower than those for the second-graders in Hawaii, the Westinghouse study distributions, too,

## TABLE 5.6

Difficulty Values (Percentages Passing) and Item-Test Point-Biserial Correlation Coefficients for the Items in the Children's Self-Concept Index (Hawaiian Second-Graders, N = 104, Spring, 1969)

| Item Number | Percentage Passing | Correlation with Total Score |
|---|---|---|
| 1 | 97 | .00 |
| 2 | 84 | .45 |
| 3 | 85 | .50 |
| 4 | 95 | .35 |
| 5 | 87 | .58 |
| 6 | 90 | .59 |
| 7 | 93 | .33 |
| 8 | 87 | .36 |
| 9 | 93 | .60 |
| 10 | 90 | .67 |
| 11 | 96 | .33 |
| 12 | 93 | .29 |
| 13 | 93 | .49 |
| 14 | 92 | .74 |
| 15 | 90 | .61 |
| 16 | 91 | .60 |
| 17 | 81 | .31 |
| 18 | 89 | .57 |
| 19 | 88 | .52 |
| 20 | 95 | .44 |
| 21 | 89 | .59 |
| 22 | 92 | .60 |
| 23 | 96 | .20 |
| 24 | 91 | .45 |
| 25 | 93 | .60 |
| 26 | 88 | .51 |

## TABLE 5.7

Frequency Distribution of Scores on
the *Children's Self-Concept Index*
(Hawaiian Second-Graders, N = 104, Spring, 1969)

| Score | Frequency |
|---|---|
| 52 | 36 |
| 51 | 24 |
| 50 | 13 |
| 49 | 11 |
| 48 | 4 |
| 47 | 4 |
| 46 | 2 |
| 45 | 1 |
| 44 | 1 |
| 43 | 0 |
| 42 | 1 |
| 41 | 2 |
| 40 | 2 |
| 39 | 1 |
| 38 | 0 |
| 37 | 0 |
| 36 | 0 |
| 35 | 1 |
| 34 | 1 |

Mean = 49.60
Standard Deviation = 3.58
Variance = 12.82
Skewness = -2.43
Kurtosis = 6.28

must have been markedly skewed. A child with a score of 47, for example, missed only five of the 26 items. Over half of the subjects missed no item or only one.

The full effects (upon estimates of test reliability and of item discrimination indices) of extreme difficulty values (either high or low), combined with extreme skewness of distributions, have not been explored. Nonetheless, extreme difficulty values and extreme skewness clearly do affect the possible range of values of both reliability estimates and point-biserial correlation coefficients. For example, consider an item such that 91% of the subjects pass. (Ninety-one is the mean percentage of the Hawaii sample passing the items of the Self-Concept test.) With the particular extremely skewed distribution for the Hawaiian second-grade total test scores, the range of possible point-biserial correlation coefficients has been calculated to be restricted to -.12, on the negative side, to .86, rather than -1.00 to 1.00. The highest possible negative value of a split-half correlation coefficient--given the restriction that the distribution of total scores is as skewed as the one for the Hawaiian sample--is -.05, only slightly below zero rather than approaching -1.00. Hence the estimates of both KR-20 reliability coefficients and point-biserial correlation coefficients appear to be rather seriously inflated.

The extent of the inflation cannot yet be pinpointed as applied to other specific skewed distributions. But the inapplicability of ordinary test statistics, or at least of their usual interpretations, seems clear. Hence the reliability estimates and the item-test coefficients for the Children's Self-Concept Index are undoubtedly inflated. In addition, and perhaps more important, attempts to measure mean gain on an instrument with such a low ceiling for the age ranges of concern would seem very likely to reveal no significant gains.

Aside from the fact that the test is too easy to be optimally discriminating for perhaps the upper two-thirds or three-fourths of the distribution, it is quite possible that it would be useful for younger children. Although Meyerowitz has indicated that he was successful in giving a group form of the test to children as young as three, an attempt to duplicate this finding with Gumpgookies led to the conclusion that use of a group form was not feasible for four-year-olds, even when the groups consisted of only five children. In view of the similarity of the test formats, this experience would suggest that the Self-Concept test not be administered as a group test to children below six years of age.

A preliminary report on the data obtained in the Westinghouse study for the first three school grades confirms the relatively low ceiling of the test, although the average scores do not reach the mean of 24 items correct that was obtained for Hawaiian second-graders (who were tested in the spring of the year). The Hawaiian sample, it should be noted, was not composed solely of children who had previously been exposed to Head Start; hence it is likely that the socioeconomic levels of their families were higher than for the Westinghouse samples. Nevertheless, the low ceiling of the test would appear to limit its usefulness as a measure for reflecting change for children in elementary schools.

## Relation of Gumpgookies to Other Tests

The fact that performance on the test is related to general intelligence and language proficiency is demonstrated by correlations obtained between Gumpgookies and several tests administered to the Hawaii Head Start sample during the 1968 national evaluation study. For this sample, quite restricted in range of ages, Gumpgookies scores correlated positively (.11) but non-significantly with age. On the other hand, Gumpgookies correlated .24 ($p < .01$) with Stanford-Binet I.Q., .31 ($p < .01$) with Preschool Inventory scores, and .18 ($p < .05$) with the Animal House subtest of the WPPSI.

The correlation of .23 ($p < .01$) between Gumpgookies and the Psycholinguistic Age score of the ITPA may indicate that the scores on both tests are partially affected by language variables or that both are affected in part by "general intelligence." But it should be kept in mind that the ITPA, as well as Gumpgookies, correlates with IQ. For a sample of 137 Hawaiian children, the Gumpgookies - ITPA r was .23, the Gumpgookies - IQ r was .24, and the ITPA - IQ r was .45. The correlation of Gumpgookies and ITPA with IQ partialled out was .14. With a standard error of the corresponding z equal to .09, this partial correlation cannot be regarded as significantly different from zero.

Finally, data for first-, second-, and fourth-graders from Hawaii public schools on the Gumpgookies and several tests of academic achievement and aptitude, among them the Metropolitan Readiness Test, the California Reading Test, and the School and College Ability Test (SCAT), indicate that a low but significant correlation exists between the Gumpgookies test of achievement motivation and presumed measures of actual achievement in school.

In summary of the results presented in this section, there is evidence that Gumpgookies is measuring aspects of motivation to achieve. The position-preference, item-position, and primacy-recency influences mentioned elsewhere in this report, plus differences in socioeconomic, ethnic, and cultural variables for the various samples studied, do not yet warrant conclusions about the relation of the Gumpgookies test with sex and/or ethnic-cultural differences. These independent efforts in the direction of concurrent validation of the test, coupled with the results of the several factor-analytical procedures given in Chapter 6, nevertheless are interpreted as warranting further efforts to understand motivation better, to measure it, and to enhance it in children at an early age.

## Data Relevant to the Reliability of Gumpgookies

The only routinely available type of reliability estimate for Gumpgookies has been KR-20 (which Cronbach refers to as alpha), as presented in Chapter 4. For many separate groups and for different forms of the test, the estimates have been consistently close to .80 for the 75-item form and well above .80 for the 100-item form. If the KR-20 estimate is to be regarded as an index of internal consistency--as indeed seems to be appropriate--and if the test reflects several factors--as seems to be amply supported in Chapter 5--then the KR-20 index can be expected to provide an under-estimate of reliability as compared with an estimate for a single-factor test of comparable length.

Clearly an estimate of reliability based upon the correlation of different forms of the test administered at different times is to be preferred. In view of other problems in development of the test, no attempt has as yet been made to develop different forms. Nor is any completely satisfactory estimate of test-retest reliability available--if ever an estimate of this type of coefficient can be regarded as satisfactory. In one instance, however, 44 children who had taken the 100-item, non-randomized form were also given the 75-item, randomized form, after an interval of two to three weeks. Many of the items in the shorter form had been revised, both with respect to wording and illustrations. The correlation between scores on the two forms was .66. The ages of the subjects ranged from 52 to 64 months, with a mean of 58 months. Although the number of cases was small, the obtained coefficient can be regarded as reasonably satisfactory considering the differences in the items and in the test format, along with a relatively narrow age range.

Two other measures of relationship between test and retest are available for sets of items in the original format. The Head Start children included in the 1968-69 evaluation samples took the 100-item, non-randomized form as a pre-test and a specially selected 55-item, non-randomized form as a post-test, some five months later. The reason for this shift from pre-test to post-test was that examiners from other Head Start Evaluation and Research Centers objected to the length of the 100-item pre-test. Later, the pre-tests were rescored on the basis of only the selected 55 items contained in the post-test. This means, of course, that the context of the items differed in the two instances. The scores for the 124 Hawaiian Head Start children having been most readily accessible, the correlation between the 55 items common to the pre-tests and post-tests for this sample was computed and found to be .35. This figure, although of some interest, is not a good estimate of test-retest reliability because the time interval was sufficiently long that differential changes in the children could be expected to have occurred.

A similar comparison was made of the scores of the 74 Hawaiian Head Start children in the combined experimental and comparison groups in the motivation curriculum study. In this case, the 100-item,non-randomized form was used. The correlation was .48. Again, although this coefficient could be expected to have some relevance to reliability, it is not an estimate of test-retest reliability.

Although the two aforementioned coefficients are not reliability coefficients in any meaningful sense, the shift from .35 to .48 in going from the 55-item form to the 100-item form is very close to the shift from .35 to .49 that the Spearman-Brown prophecy formula would predict.

# CHAPTER 6

# FACTOR ANALYSES OF RANDOMIZED FORMS OF GUMPGOOKIES FOR FIRST-, SECOND-, AND FOURTH-GRADERS AND FOR TEN GROUPS OF PRESCHOOLERS

The concept of motivation, somewhat like that of general intelligence, perhaps can be useful at different levels in a hierarchical structure. Hence a dominant concern of the series of investigations reported herein has been to develop a general measure of motivation to achieve in school that will be consonant with a theoretical base. At the same time, the score or scores resulting from the instrument should make sense in terms of empirical relationships with such variables as measures of IQ; other tests that might be expected to have a correlation with the motivation measure; tests purported to get at actual achievement; other persons' appraisals of motivation to achieve as distinct from aptitude and actual achievement; and, finally, such variables as age, sex, and the pervasive multiplicity of elements that have been blanketed under the term "ethnic-cultural" groups.

Previous chapters have presented evidence that a total score on the *Gumpgookies* test *can* be obtained, even for four-year-old children from impoverished environments, that has properties in line with the major objectives.

Another important aspect of the studies that have been done concerns lower-level factors that might be exhibited among the items of the *Gumpgookies* test. The hope was that such a series of analyses might indicate components of motivation that were perhaps under-represented or over-represented in the total score. The reader has already been alerted to the fact that young children may be affected, in part, by the position of the right answer to an item, by the position of an item in a test, or by the order in which an alternative for an item is expressed. The total score on current forms of the test, it is stressed, should not be affected systematically by such influences, for reasons reiterated below.

Items for the three forms of Gumpgookies--a 75-item, individually-administered form; a 100-item, group-administered form for non-readers; and a 100-item, group-administered form for readers--were assembled in such a way that approximately equal numbers of items had the correct answers in the left, right, up, and down frames of the illustrations. Some illustrations were also placed in the up-left, down-left, up-right, and down-right positions. The instructions to examiners also specified the order of describing illustrations for the individual and the group form for non-readers, in such a way that the possible influence on the total score of a tendency to choose the first answer described or a tendency to choose the second answer described would be minimized. For a small number of items in both forms (five), the separate illustrations are not described, as in items that pose such questions as "Which is your gumpgookie climbing the tree?"

Because of various circumstances that will not be explicated, the desired equality with respect to all possible comparisons that might be examined was not achieved exactly. Nevertheless, the numbers of correct answers in the main answer positions--right, left, up, and down--are very nearly the same, as are the numbers of items that could reflect either primacy or recency.

With the form of test used for readers, as in the fourth-grade sample, no control could be exercised over the possible influence of primacy versus recency, i.e., over which illustration was described first. The supposition has been that the descriptions appearing at the left, up, up-left, or up-right positions would be read by the subject before those appearing at the right, down, down-left or down-right positions.

These precautions having been taken in designing the format of the test, the expectation would be that the total score would not be affected in any systematic way by tendencies of particular children to be influenced by answer-position preferences or by order of presentation of alternatives.

This chapter, following its lengthy preamble, will present some of the many factor analyses that have been made of the three randomized forms of the Gumpgookies test. The reader will be spared some ventures into cul de sacs as well as the details of test runs periodically made to assure that the programs and equipment were yielding correct results.

The analyses have veered back and forth between oblique and orthogonal rotations. Nevertheless, though arguments in favor of relatively independent factors at times seem persuasive, the latest inclination of the authors is towards oblique solutions, which, after all, can yield orthogonal factors if the data so dictate.

## Factor Analyses for the Three Grade Groups

The first two group forms of Gumpgookies were administered to 212 first-graders, 223 second-graders, and 233 fourth-graders in Honolulu schools. For each grade group separately, a principal-axes solution for six factors was obtained and rotated to an oblique simple structure by a biquartimin solution with gamma equal to .5. Table 6.1 presents the three sets of rotated (oblimin oblique) factor loadings.

## An Initial Approach to Super-Factors for the Three Grade Groups

Comparison of the factors across grades by inspection alone was almost impossible. Hence, at the suggestion of Paul Horst, the Pearson correlation coefficients among the 18 sets of factor loadings (six sets for each grade) were obtained. These are given in Table 6.2.

## TABLE 6.1

### Obliquely Rotated Factor Loadings for the 100-Item Group Form of Gumpgookies for Three Grade Groups (First, Second, and Fourth)

| | Factor Loadings* | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Item Number | Factors for First Grade (N = 212) | | | | | | Factors for Second Grade (N = 223) | | | | | | Factors for Fourth Grade (N = 233) | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| 1 | 12 | 45 | 08 | 22 | 06 | -18 | 35 | 15 | 24 | 18 | 14 | 02 | 13 | 04 | -09 | 45 | -07 | 12 |
| 2 | 05 | 17 | 01 | 15 | 37 | 06 | 16 | -01 | -05 | -12 | 02 | 42 | 19 | 08 | -07 | 43 | 02 | 47 |
| 3 | -13 | 24 | 10 | 19 | 07 | -03 | -07 | 03 | 00 | 32 | -05 | -05 | 00 | -08 | -07 | -09 | 09 | -01 |
| 4 | -05 | 30 | -07 | 27 | 24 | 06 | -05 | 11 | 35 | 07 | -05 | 15 | -09 | 57 | 11 | 01 | 20 | -09 |
| 5 | 30 | 32 | -17 | 38 | -08 | 28 | -03 | 54 | 18 | -21 | -09 | 06 | 08 | 08 | 55 | 14 | 06 | 01 |
| 6 | 05 | 22 | 35 | 26 | 20 | 10 | 38 | 25 | 40 | 03 | 05 | 21 | 54 | 20 | 08 | 14 | 02 | 21 |
| 7 | -02 | 48 | 07 | 19 | 30 | -12 | 12 | 25 | 25 | 19 | 14 | 52 | 15 | 01 | 05 | 12 | 00 | 35 |
| 8 | 01 | -11 | -15 | -18 | -18 | 14 | -23 | 03 | 09 | 15 | -26 | 18 | -17 | 21 | 14 | -07 | 18 | -04 |
| 9 | 18 | 10 | -25 | 05 | 10 | 01 | -20 | 05 | 16 | 03 | -24 | 15 | 00 | 22 | 11 | 03 | 22 | -19 |
| 10 | 06 | 39 | 11 | 01 | 14 | -24 | -07 | 34 | 18 | 24 | -02 | 05 | 17 | 07 | 07 | 67 | -17 | 44 |
| 11 | 38 | 41 | -12 | 21 | -01 | 45 | 01 | 63 | 16 | -08 | 30 | 22 | -02 | 16 | 71 | 01 | 16 | -03 |
| 12 | 14 | 02 | -06 | -14 | 31 | 12 | 02 | 22 | 33 | 14 | 10 | 34 | 03 | 67 | 24 | 14 | 05 | 07 |
| 13 | 05 | 28 | -08 | 31 | -19 | 03 | 21 | 19 | 35 | -14 | 44 | 12 | 33 | 09 | -07 | 23 | -12 | 23 |
| 14 | 30 | 61 | -13 | 21 | 03 | 17 | 10 | 50 | 19 | 45 | 24 | 26 | -01 | 23 | 09 | 40 | -01 | -19 |
| 15 | 31 | 54 | -15 | 13 | 29 | 19 | -06 | 43 | 17 | 19 | -02 | 19 | -03 | 14 | 28 | -06 | 04 | 05 |

*Decimal points have been omitted.

TABLE 6.1 (cont.)

Factor Loadings*

| Item | Factors for First Grade (N = 212) | | | | | | Factors for Second Grade (N = 223) | | | | | | Factors for Fourth Grade (N = 233) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| 16 | 24 | 53 | 07 | 31 | -03 | 21 | 12 | 71 | 27 | 07 | 25 | 10 | 19 | 27 | 77 | 09 | 17 | 18 |
| 17 | 16 | 19 | 09 | 40 | 03 | 21 | 50 | 12 | 16 | 10 | 03 | 14 | 57 | 01 | 21 | 10 | -01 | 10 |
| 18 | 45 | 39 | -03 | 29 | 07 | 51 | -06 | 54 | -09 | -12 | -10 | 08 | 09 | 36 | 52 | 26 | 12 | 30 |
| 19 | 06 | 00 | 06 | -02 | 18 | -04 | 09 | 25 | 12 | -15 | -14 | 29 | -19 | 08 | 23 | -02 | 22 | -09 |
| 20 | 19 | 37 | 40 | 34 | -08 | -18 | 62 | 14 | 16 | -02 | 14 | -05 | 51 | -08 | 06 | 04 | 09 | 23 |
| 21 | 71 | 55 | 11 | 30 | 16 | -11 | 02 | 34 | 30 | 14 | 48 | 09 | 01 | -01 | 32 | 58 | -12 | 24 |
| 22 | 33 | 22 | 04 | 17 | -08 | 13 | 17 | 27 | 27 | -14 | -08 | 12 | 09 | -19 | 19 | -05 | -06 | 22 |
| 23 | 48 | 50 | 06 | 25 | -02 | 45 | 19 | 53 | 21 | 28 | 14 | -05 | 24 | 20 | 43 | 20 | -10 | 42 |
| 24 | 17 | 22 | -15 | 01 | 10 | 18 | 06 | 28 | 13 | -11 | 19 | 19 | 28 | 00 | 26 | -17 | -18 | 10 |
| 25 | 23 | 35 | 03 | 06 | 05 | -06 | 28 | 33 | 19 | 31 | 05 | 18 | 17 | 24 | 01 | -38 | -10 | 02 |
| 26 | 29 | 70 | 17 | 30 | -04 | 11 | 12 | 31 | 18 | -02 | 44 | 23 | 16 | 02 | 35 | 31 | -05 | 07 |
| 27 | 07 | 45 | 60 | 26 | 11 | -01 | 65 | 15 | 35 | 09 | 06 | 17 | 71 | 05 | 14 | 12 | 03 | 24 |
| 28 | 08 | 32 | 05 | 12 | 17 | 16 | -02 | 02 | 16 | 09 | -23 | 08 | 02 | 22 | 18 | 28 | 18 | -14 |
| 29 | 25 | 48 | 28 | 23 | -10 | -04 | 41 | 27 | 60 | 05 | 16 | 07 | 33 | 13 | 06 | 23 | -02 | 40 |
| 30 | 18 | 33 | -15 | 10 | -05 | -16 | 11 | -08 | -06 | 05 | 06 | 56 | -22 | 24 | -15 | 02 | 02 | -03 |
| 31 | 33 | 83 | 09 | 29 | 14 | 04 | 01 | 26 | 34 | 37 | -15 | 29 | 08 | 72 | 18 | 41 | -01 | -03 |
| 32 | 24 | 59 | -02 | 41 | -35 | 01 | 16 | 44 | 25 | 05 | 17 | 13 | 26 | 28 | 38 | 18 | 03 | 12 |
| 33 | 50 | 47 | -05 | 16 | 03 | 49 | 08 | 64 | 30 | -08 | -09 | 15 | 08 | 01 | 71 | -01 | 11 | -02 |
| 34 | 22 | 07 | 05 | -18 | -16 | -34 | 23 | -15 | -11 | 13 | 09 | 08 | 43 | 12 | -16 | 12 | -08 | -16 |
| 35 | 21 | 35 | 49 | 20 | 03 | -04 | 45 | 16 | 26 | 16 | 09 | -07 | 67 | 08 | 06 | 11 | 09 | 20 |

*Decimal points have been omitted.

## TABLE 6.1 (cont.)

### Factor Loadings*

| Item Number | Factors for First Grade (N = 212) | | | | | | Factors for Second Grade (N = 223) | | | | | | Factors for Fourth Grade (N = 233) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| 36 | 21 | 17 | -25 | -01 | 02 | 09 | -25 | 14 | 12 | 08 | -02 | 18 | 37 | 02 | 08 | 11 | 35 | 32 |
| 37 | 20 | 63 | 15 | 43 | 15 | 21 | 15 | 40 | 15 | 20 | 13 | -03 | 17 | -03 | 32 | -06 | 16 | 34 |
| 38 | 31 | 07 | 14 | 02 | -29 | 07 | 12 | 13 | 30 | -02 | 00 | 02 | 21 | -13 | 18 | -05 | 01 | 24 |
| 39 | 32 | 47 | -02 | 12 | -10 | 01 | 07 | 04 | 34 | -05 | 14 | -09 | 11 | 06 | -13 | 05 | -20 | 04 |
| 40 | 39 | 47 | 14 | 04 | -09 | 30 | 31 | -07 | 18 | 00 | -06 | -04 | 31 | 21 | 12 | 33 | -17 | -01 |
| 41 | 14 | 02 | 01 | -02 | -36 | 01 | 23 | 14 | 10 | 09 | 11 | 01 | 21 | 02 | 13 | 12 | -23 | 13 |
| 42 | 24 | 10 | 18 | -25 | -11 | 13 | 14 | 46 | 30 | -13 | -06 | 64 | -03 | 04 | 29 | 25 | -12 | 35 |
| 43 | 21 | 15 | 52 | 17 | -28 | -20 | 53 | 09 | -02 | -13 | -02 | -07 | 47 | 01 | 06 | -08 | -09 | 29 |
| 44 | 07 | 15 | 05 | 11 | -07 | -14 | 49 | -01 | 05 | -08 | 24 | 05 | 48 | 12 | -03 | 22 | -24 | 03 |
| 45 | 48 | 53 | -02 | 17 | -09 | 12 | 15 | 33 | 32 | 36 | 12 | 11 | 29 | 27 | 04 | 31 | -16 | 01 |
| 46 | 51 | 55 | -08 | 21 | 34 | 15 | 04 | 23 | 37 | -38 | 13 | 23 | 09 | 00 | 02 | -05 | -10 | 03 |
| 47 | 61 | 60 | 08 | 24 | 28 | -01 | 03 | 16 | 19 | 38 | -08 | 23 | 04 | 53 | -06 | 03 | -04 | 33 |
| 48 | 27 | 14 | 34 | -03 | 03 | 24 | 62 | 06 | 17 | 02 | 06 | 13 | 68 | -09 | 06 | 07 | 07 | 22 |
| 49 | 08 | -05 | 02 | -15 | -05 | 30 | -04 | 30 | 08 | -01 | 08 | -09 | -05 | 17 | 23 | 07 | 19 | -25 |
| 50 | 04 | 27 | -04 | 12 | 41 | 07 | 04 | 13 | 18 | -13 | 27 | 06 | 07 | 15 | 06 | -01 | 46 | -03 |
| 51 | 11 | 21 | 44 | 24 | 11 | 16 | 68 | 14 | 03 | -08 | 06 | 03 | 69 | -07 | 07 | 00 | -03 | 11 |
| 52 | 35 | 23 | 28 | 29 | -05 | -09 | 49 | 36 | 27 | -16 | 29 | 05 | 28 | 10 | -02 | 19 | -01 | 17 |
| 53 | 08 | 23 | 18 | 51 | 08 | -06 | 45 | 12 | 22 | 01 | 17 | -04 | 54 | 12 | 14 | 03 | -11 | -01 |
| 54 | 06 | 13 | 04 | 21 | 21 | -04 | 19 | 17 | 22 | 17 | -08 | 14 | -30 | 00 | -13 | 13 | 03 | 07 |
| 55 | 00 | -09 | 39 | -20 | -08 | -09 | 27 | -15 | -35 | -10 | 04 | 03 | 30 | -06 | -03 | 05 | -16 | 16 |

*Decimal points have been omitted.

TABLE 6.1 (cont.)

Factor Loadings*

| Item Number | Factors for First Grade (N = 212) | | | | | | Factors for Second Grade (N = 223) | | | | | | Factors for Fourth Grade (N = 233) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| 56 | 36 | 40 | 00 | 07 | 40 | 11 | 05 | -09 | 04 | -04 | 02 | 43 | -11 | 40 | -05 | 17 | 46 | -03 |
| 57 | 24 | 42 | 39 | 40 | 12 | 04 | 41 | 07 | 11 | 00 | 22 | 11 | 61 | -05 | 17 | 04 | -07 | 08 |
| 58 | 12 | 23 | -03 | 37 | 02 | -03 | 20 | 06 | -01 | 20 | 19 | 10 | -04 | 03 | -05 | -04 | 09 | 03 |
| 59 | 36 | 55 | -08 | 42 | 12 | -27 | 19 | 24 | 30 | -07 | 65 | 28 | -01 | 31 | 09 | -08 | -03 | 10 |
| 60 | 61 | 47 | 24 | 21 | 17 | 06 | 34 | 20 | 51 | 03 | 18 | 14 | 19 | 42 | 30 | 16 | 07 | -02 |
| 61 | 32 | 22 | 17 | 18 | -11 | 14 | 10 | 04 | 16 | -11 | 20 | 05 | 01 | -15 | 22 | -04 | 19 | 00 |
| 62 | 26 | 34 | -16 | 18 | 32 | 16 | 04 | 43 | 52 | 07 | 15 | 30 | 24 | 13 | 25 | -06 | 30 | 15 |
| 63 | 50 | 40 | 34 | 35 | 29 | 09 | 65 | 22 | 14 | -06 | 08 | 20 | 68 | -09 | 16 | 09 | -04 | 29 |
| 64 | -04 | -06 | -51 | -05 | -07 | 15 | -41 | 11 | 23 | -06 | -06 | 17 | -11 | 51 | 07 | 02 | 30 | 03 |
| 65 | -08 | -09 | 21 | -08 | -02 | -04 | 07 | 22 | 18 | 21 | -01 | 05 | 18 | 05 | 25 | 02 | -01 | 44 |
| 66 | 40 | 29 | -13 | 29 | 34 | 25 | 27 | 42 | 19 | 05 | 27 | 30 | 24 | 04 | 02 | 28 | 03 | 29 |
| 67 | 11 | 08 | -21 | 19 | 37 | 20 | -15 | 12 | 11 | 15 | -03 | 31 | -05 | 29 | 29 | 26 | 36 | 12 |
| 68 | 66 | 61 | 05 | 17 | -01 | 07 | 12 | 33 | 39 | -06 | 03 | 14 | 21 | 40 | 17 | 30 | 31 | 25 |
| 69 | 53 | 27 | 23 | 27 | 24 | -19 | 42 | 28 | 18 | -14 | 42 | 16 | 38 | 00 | 02 | 26 | -05 | 31 |
| 70 | 22 | 22 | 03 | 51 | 18 | 25 | 22 | 42 | 23 | 13 | 06 | 06 | 22 | 35 | 15 | 04 | 26 | -09 |
| 71 | 58 | 37 | 18 | 33 | 09 | 15 | 22 | 23 | 57 | 02 | 19 | 10 | 12 | -01 | 07 | 21 | -05 | 08 |
| 72 | 10 | 28 | 04 | 10 | -01 | -05 | -01 | 01 | 30 | 29 | 11 | 06 | -03 | 51 | 12 | 11 | 16 | -20 |
| 73 | 58 | 19 | 07 | 11 | -05 | 03 | 04 | 18 | 27 | 43 | 14 | 44 | 06 | 00 | -06 | 42 | 03 | -08 |
| 74 | 53 | 46 | -03 | 20 | 14 | 22 | -11 | 32 | 52 | -08 | -17 | 34 | 05 | 26 | 36 | 41 | 44 | -22 |
| 75 | 36 | 21 | -05 | 29 | -12 | 10 | 31 | 61 | 18 | -07 | 22 | 14 | 20 | 25 | 37 | 37 | 42 | 05 |

*Decimal points have been omitted.

## TABLE 6.1 (cont.)

### Factor Loadings*

| Item Number | Factors for First Grade (N = 212) | | | | | | Factors for Second Grade (N = 223) | | | | | | Factors for Fourth Grade (N = 233) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| 76 | 34 | 25 | 16 | 06 | -31 | -28 | 19 | -13 | -10 | 12 | 11 | -31 | 14 | -13 | 03 | 02 | -33 | 03 |
| 77 | 18 | 15 | 02 | 51 | 00 | -17 | 07 | 05 | 12 | 26 | 55 | 12 | -02 | 00 | 26 | 55 | -07 | 08 |
| 78 | 22 | 32 | 45 | 31 | 18 | -44 | 58 | 13 | 30 | -06 | 15 | 25 | 58 | -03 | -09 | 22 | -18 | 06 |
| 79 | 65 | 52 | 05 | 26 | 13 | 30 | 11 | 69 | 37 | 19 | 09 | 12 | 16 | 27 | 33 | 00 | 41 | 06 |
| 80 | 50 | 58 | 17 | 46 | -05 | 07 | 36 | 24 | 27 | -35 | 06 | 22 | 16 | 02 | 25 | 33 | 24 | 02 |
| 81 | -02 | -07 | 60 | 16 | 17 | -10 | 63 | -01 | 10 | 06 | 14 | 10 | 36 | 00 | 06 | 03 | -25 | -01 |
| 82 | 69 | 55 | -02 | 14 | 02 | 12 | 18 | 52 | 32 | 09 | -16 | 50 | 14 | 00 | 22 | 21 | 30 | 40 |
| 83 | 37 | 38 | -00 | 23 | -15 | 02 | 12 | 22 | 16 | 11 | 07 | -16 | -07 | 29 | 03 | -05 | 09 | -04 |
| 84 | 23 | 11 | 03 | 06 | -07 | -34 | 36 | 14 | 08 | -27 | -04 | 10 | 52 | 12 | -08 | 23 | -12 | 09 |
| 85 | 01 | 10 | -23 | 12 | 06 | -14 | -08 | 32 | 23 | 22 | -24 | 13 | -15 | 26 | 14 | 05 | 25 | 19 |
| 86 | 60 | 38 | 29 | 23 | 11 | -04 | 29 | 16 | 41 | -03 | 20 | -03 | 30 | -12 | 08 | 11 | 01 | 03 |
| 87 | 04 | 29 | -11 | 24 | 18 | -01 | -18 | 00 | 11 | 12 | 19 | 28 | 05 | 44 | 18 | 35 | 56 | -08 |
| 88 | 56 | 39 | -16 | 45 | 06 | -16 | -03 | 04 | 13 | 20 | 34 | 01 | 02 | 28 | 15 | 00 | 12 | -14 |
| 89 | 08 | 12 | 20 | 36 | 02 | -13 | 35 | 03 | 21 | 13 | 10 | -13 | 30 | -13 | 10 | -02 | 02 | 13 |
| 90 | 20 | 22 | 42 | 17 | -20 | -11 | 61 | 12 | 00 | -08 | -08 | 10 | 44 | -05 | 05 | 05 | 07 | 12 |
| 91 | 48 | 23 | -03 | 26 | -07 | -02 | 24 | 31 | 51 | 10 | 22 | 07 | 11 | 04 | 38 | 09 | 52 | 03 |
| 92 | 28 | 37 | 03 | 52 | -13 | 17 | 02 | 45 | 44 | -04 | 17 | 43 | 17 | 16 | 64 | 35 | 17 | -07 |
| 93 | 56 | 36 | -14 | 31 | -21 | 04 | 18 | 32 | 50 | -11 | -17 | 18 | 28 | 41 | -06 | 42 | 06 | -05 |
| 94 | 57 | 30 | -21 | 21 | -07 | 02 | 22 | 43 | 19 | -44 | 13 | 25 | 01 | -01 | 00 | 44 | 09 | 09 |
| 95 | 24 | 21 | 15 | 39 | -08 | -09 | 30 | 16 | 49 | 03 | 17 | 10 | 14 | 21 | 02 | -03 | 19 | 09 |

*Decimal points have been omitted.

## TABLE 6.1 (cont.)

### Factor Loadings*

|  | Factors for First Grade (N = 212) |  |  |  |  |  | Factors for Second Grade (N = 223) |  |  |  |  |  | Factors for Fourth Grade (N = 233) |  |  |  |  |  |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Item Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| 96 | 20 | 20 | -15 | 31 | -19 | -29 | -02 | 16 | 13 | -06 | 37 | -02 | 06 | 27 | 20 | 36 | 15 | 33 |
| 97 | 34 | 21 | 15 | 32 | -07 | -17 | 05 | 11 | 37 | 23 | 13 | 11 | 10 | 27 | -09 | 02 | 05 | 37 |
| 98 | 51 | 23 | -18 | 09 | -02 | 20 | 02 | 14 | 61 | 18 | 08 | 18 | -01 | 51 | 11 | 03 | 24 | 02 |
| 99 | 41 | 03 | -10 | -13 | -05 | 16 | 24 | 02 | 08 | 30 | 34 | -04 | 26 | 43 | 01 | 28 | -08 | 12 |
| 100 | 58 | 17 | 13 | 17 | 16 | 05 | 02 | 27 | 43 | 08 | 16 | 38 | 35 | 13 | -06 | 39 | -20 | 03 |

*Decimal points have been omitted.

## TABLE 6.2

### Correlations Among the 18 Sets of Oblique Factor Loadings for the Six Factors for Each of Three Grade Groups (First, Second, and Fourth), Based on a 100-Item Group Form of Gumpgookies

| | | Correlations* for | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | First-Grade Factors | | | | | | Second-Grade Factors | | | | | | Fourth-Grade Factors | | | | | |
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| 1st Grade | 1 | | 51 | -06 | 23 | -02 | 23 | 02 | 39 | 40 | -09 | 17 | 11 | -00 | 06 | 17 | 25 | 04 | 01 |
| | 2 | 51 | | 02 | 51 | 17 | 17 | 02 | 42 | 35 | 09 | 17 | 12 | 01 | 15 | 24 | 23 | 02 | 06 |
| | 3 | -06 | 02 | | 13 | -03 | -27 | 78 | -20 | -06 | -06 | 08 | -24 | 66 | -44 | -15 | -07 | -38 | 26 |
| | 4 | 23 | 51 | 13 | | 11 | -03 | 24 | 27 | 28 | -04 | 38 | -08 | 16 | -05 | 20 | 09 | 09 | 02 |
| | 5 | -02 | 17 | -03 | 11 | | 15 | -10 | 04 | 09 | 09 | -01 | 38 | -08 | 15 | -05 | 02 | 22 | 02 |
| | 6 | 23 | 17 | -27 | -03 | 15 | | -26 | 51 | 15 | -04 | -22 | 14 | -14 | 16 | 59 | -08 | 31 | -09 |
| 2nd Grade | 7 | 02 | 02 | 78 | 24 | -10 | -26 | | -12 | -05 | -22 | 21 | -22 | 76 | -43 | -23 | -05 | -41 | 23 |
| | 8 | 39 | 42 | -20 | 27 | 04 | 51 | -12 | | 39 | -06 | 04 | 21 | -10 | 08 | 66 | 16 | 21 | 17 |
| | 9 | 40 | 35 | -06 | 28 | 09 | 15 | -05 | 39 | | 04 | 08 | 20 | -03 | 23 | 16 | 13 | 19 | -01 |
| | 10 | -09 | 09 | -06 | -04 | 09 | -04 | -22 | -06 | 04 | | -01 | -06 | -17 | 29 | -10 | 09 | -03 | -03 |
| | 11 | 17 | 17 | 08 | 38 | -01 | -22 | 21 | 04 | 08 | -01 | | -11 | 13 | -12 | 02 | 14 | -20 | 07 |
| | 12 | 11 | 12 | -24 | -08 | 38 | 14 | -22 | 21 | 20 | -06 | -11 | | -23 | 19 | 05 | 26 | 22 | 03 |
| 4th Grade | 13 | 00 | 01 | 66 | 16 | -08 | -14 | 76 | -10 | -03 | -17 | 13 | -23 | | -36 | -13 | 01 | -36 | 30 |
| | 14 | 06 | 15 | -44 | -05 | 15 | 16 | -43 | 08 | 23 | 29 | -12 | 19 | -36 | | 08 | 15 | 34 | -27 |
| | 15 | 17 | 24 | -15 | 20 | -05 | 59 | -23 | 66 | 16 | -10 | 02 | 05 | -13 | 08 | | -01 | 32 | -02 |
| | 16 | 25 | 23 | -07 | 09 | 02 | -08 | -05 | 16 | 13 | 09 | 14 | 26 | 01 | 15 | -01 | | -09 | 08 |
| | 17 | 04 | 02 | -38 | 09 | 22 | 31 | -41 | 21 | 19 | -03 | -20 | 22 | -36 | 34 | 32 | -09 | | 22 |
| | 18 | 01 | 06 | 26 | 02 | 02 | -09 | 23 | 17 | -01 | -03 | 07 | 03 | 30 | -27 | -02 | 08 | -22 | |

*Decimal points have been omitted.

Inspection of the relations among the factors for the three grade groups revealed two factors that are clearly similar for the three groups. Table 6.3 highlights these relations.

As an aid in interpreting these two factors that were determined by inspection to cut across all three grade groups, a list was made of the factor loadings for each of the grades for items with the highest loadings (a sum equal to at least .50).* Inspection of the items with the highest loadings for these two "super-factors" led to quite meaningful interpretations. The first factor, A, is loaded heavily with items that stress excellence and winning--for example, items embodying such contrasts as "doesn't know" versus "_knows_," "knows some" versus "_knows more_," "racing" versus "_winning_," "one of the class" versus "_best of the class_," "has some friends" versus "_has more friends_," and "just like others" versus "_better than others_." The emphasis on aspiration toward excellence is compelling, and the factor seems to involve primarily _self-confidence in ability to excel_. Aspiration toward excellence is accompanied by confidence in one's ability. The factor seems to be tapping an important component of achievement motivation, a _conceptual_ component, whereby the individual sees himself as a high achiever.

Super-factor B, by means of a similar inspection of items with high loadings for the three groups, was at first interpreted as positive orientation to school. The best items reveal such contrasts as "_likes school_" versus "doesn't," "_school is fun_" versus "gets tired in school,"

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*This list is not included here, because in the meantime the test has been revised to reduce the number of items to 75. For some of the retained items, revisions of wording and of illustrations have been made.

## TABLE 6.3

Two Sets of Correlated Factor
Loadings Across Grade Groups

| | | Grade | 1 | 2 | 4 |
|---|---|---|---|---|---|
| | | Factor | 3 | 7 | 13 |
| Grade | Factor | | | | |
| 1 | 3 | | -- | .78 | .66 |
| 2 | 7 | | .78 | -- | .76 |
| 4 | 13 | | .66 | .76 | -- |
| | | Grade | 1 | 2 | 4 |
| | | Factor | 6 | 8 | 15 |
| Grade | Factor | | | | |
| 1 | 6 | | -- | .51 | .59 |
| 2 | 8 | | .51 | -- | .66 |
| 4 | 15 | | .59 | .66 | -- |

"wants to stay in school" versus "wants to go home," "likes to learn" versus "likes to play," "helps before school" versus "plays before school," "stays to listen to the teacher read" versus "goes out to play," and "trying to write" versus "watching." The loadings of certain items, however, suggest that work enjoyment is a more apt description of this affective component of motivation, because some of the items refer to work in any situation.

Once the correlations for the factors involved in super-factors A and B had been extracted from the intercorrelations in Table 6.2, the next highest inter-grade coefficient was .40, between factor 1 in the first grade and factor 9 in the second grade. Neither of these had a correlation above .25 for any factor in the fourth grade. Although the interpretation did not seem so clear as for the first two super-factors, a tentative hypothesis was that this super-factor, C, represented interest in activity--in doing something, learning something, making something, telling, practicing, jumping, thinking, counting, etc.

## Factoring the Factor Loadings To Get Super-Factors for the Three Grade Groups

In order to facilitate further comparisons among the factors for the three grade groups, the Pearson correlation coefficients among the factor loadings for the original, obliquely rotated factors (Table 6.1) were themselves factored. Two orthogonally rotated solutions were obtained, one with three factors and one with six. The latter was more fruitful, so that only it will be presented (see Table 6.4). In general, the three-factor solutions confirmed the three strongest super-factors in the six-factor solution.

## TABLE 6.4

### Orthogonally Rotated Factor Loadings Based Upon Pearson Correlation Coefficients of Obliquely Rotated Factor Loadings for First-, Second-, and Fourth-Graders (100-Item Form of Gumpgookies, N's 212, 223, and 233, Respectively)

| | | | Super-Factor Loadings* | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | A | B | C | D | E | F |
| Initial Factors | First Grade | 1 | -02 | 40 | 44 | 08 | -08 | 41 |
| | | 2 | 05 | 36 | 28 | 29 | 12 | 58 |
| | | 3 | 86 | -14 | -11 | 06 | -03 | 07 |
| | | 4 | 16 | 15 | -11 | 01 | 10 | 83 |
| | | 5 | -01 | -03 | -10 | 12 | 87 | 10 |
| | | 6 | 15 | 80 | -11 | 04 | 11 | -16 |
| | Second Grade | 7 | 86 | -14 | -06 | -09 | -07 | 21 |
| | | 8 | -04 | 81 | 26 | -06 | 05 | 20 |
| | | 9 | -06 | 36 | 21 | 31 | 16 | 38 |
| | | 10 | -04 | -13 | 02 | 80 | -02 | -04 |
| | | 11 | 07 | -22 | 14 | -23 | -14 | 70 |
| | | 12 | -20 | 10 | 41 | -12 | 70 | -11 |
| | Fourth Grade | 13 | 84 | -04 | -02 | -02 | -07 | 08 |
| | | 14 | -58 | 08 | 06 | 54 | 15 | 02 |
| | | 15 | -12 | 81 | -10 | -14 | -08 | 11 |
| | | 16 | -08 | -05 | 77 | 08 | 05 | 14 |
| | | 17 | -47 | 34 | -34 | 01 | 38 | 06 |
| | | 18 | 51 | 10 | 40 | -16 | 11 | -16 |

*Decimal points have been omitted.

The super-factors previously described, A--self-confidence in ability to excel--and B--work enjoyment, were clearly identifiable in this solution, A having its highest loadings on the initial factors 3, 7, and 13 and B its highest loadings on 6, 8, and 15. Two additional super-factors are revealed by the analysis: C, comprised of initial factors 1, 9, and 16; and D, comprised of initial factors 2, 10, and 14.

For confirmation of the original interpretations of super-factors A and B and for arriving at interpretations of super-factors C and D, an attempt was made to assign each test item to a single super-factor on the basis of its loadings on the initial factors comprising the super-factors. Nineteen items went with A, 11 with B, 21 with C, and 14 with D. Only seven items could be associated uniquely with super-factor F, comprised of factors 4 and 11 but with no high loading among the fourth-grade factors.

Although nine items could be assigned to super-factor E, weighted with factors 5, 12, and 17, a fully satisfactory interpretation of it was not achieved. Several of the items, alone or in combination with others, suggested the ability to maintain attention in order to satisfy curiosity, but this interpretation was not highly compelling and was not confirmed by subsequent analyses based upon what seemed to be superior methodology.

Nineteen items were not strongly associated with any of the super-factors.

Items for super-factor C again suggest activity in a variety of settings. The activities involved transcend the school environment, although a small proportion are school-related or could occur in school. The content of several of the items brings to mind the idea of persistence. Overall, the factor suggests knowing what action to take, knowing the instrumental steps to an end. It is regarded as a cognitive component of motivation, i.e., knowing instrumental steps. It will be referred to as instrumental activity.

Super-factor D, consisting of initial factors 2, 10, and 14, contains 14 items. Its interpretation is somewhat more difficult than for the other super-factors, perhaps partly because factor 2 is more highly loaded on super-factor F (for which factor 4, however, has a much higher loading and for which no interpretation has suggested itself). Observe, also, that factor 14 is negatively loaded on super-factor A, interpreted as self-confidence in ability to excel.

Almost all of the items assigned to super-factor D contain a reference to some model. Either the teacher or parents are present in the setting, i.e., watching the teacher, showing something to the mother, the teacher knows about him, telling his family, parents are sad. Some items also emphasize one's own independent accomplishments. The factor seems to involve ability to establish a goal, awareness of future goals, willingness to postpone gratification. It is tentatively interpreted as representing a purposive component of motivation to achieve, responsiveness to future goals. In some of the early factorizations of data for four-year-olds who had taken early forms of the individual test, a similar factor had suggested itself.

Other considerations have already led to reduction in the number of items and to revised wording in many of the items in the forms of the test used in the cross-cultural comparisons for four-year-olds and for other current purposes. Nevertheless, a further pursuit of unambiguous interpretations of super-factors for these first-, second-, and fourth-graders was regarded as potentially fruitful. It was decided to explore further the use of an orthogonal instead of an oblique transformation for the original principal axes solution for each of the three grade groups. Because the test has been revised and because facilities for analysis of data were not limitless, however, additional work to interpret the resulting super-factors has not been undertaken.

Despite some further complications with reference to position influences, (i.e., reflecting a tendency to select answers in a particular location), primacy versus recency influences (i.e., reflecting a tendency to select answers heard first or last), and effects of item locations in the test, which are described later in this chapter, the first discovery of four identifiable super-factors, with the possibility of a fifth, was regarded as very encouraging. Although a few of the items (e.g., "needs help in getting dressed") are inappropriate for fourth-graders, as was anticipated, eventual production of a form that has factorial validity for children through age nine or possibly even 10 seemed assured. Hence one further type of analysis of these data for the three grade groups will be described later in this chapter.

## Factor Analyses for the Ten Ethnic-Cultural Groups of Preschool Children

The 75-item form of Gumpgookies, with every feature possible randomized, was administered in the spring of 1969 to children averaging slightly younger than five years of age in 10 subgroups: 225 Mormons, 200 Catholics, 197 Jews, 90 Puerto Ricans, 202 Negroes (urban), 36 Whites (rural), 47 Hawaiians, 39 Orientals from the United States West Coast, 114 Mexican-Americans, and 234 American Indians. Additional data for Hawaiian Head Start classes which were tested in the fall of 1969 were later added for certain analyses to bring the total N for Hawaiians to 270.

The principal-axes method of factor analysis was applied to each sample, and the resulting 10 matrices of six factors each were rotated to orthogonal simple structure.

These matrices, not here reproduced, have yet to be fully studied in a number of respects. It is clear at this point that the factorial structure of the test is not identical for all groups, even those with the larger N's or those for which socioeconomic levels can be regarded as similar. Also, in the course of other aspects of the investigation, differences among groups in susceptibility to extraneous influences such as answer position and primacy versus recency in the presentation of item alternatives were suggested. Extensive work on the _differences_ among factors for the subsamples must await further resources. In the meantime, _similarities_ among the factors have been explored in various ways, and these are being reported.

## Initial Approaches to Super-Factors for the Ten Ethnic-Cultural Groups

With the larger number of solutions to be condensed, the task by inspection alone was even more formidable than in the case of the three solutions for the 100-item form that had been given to first-, second-, and fourth-graders. A table was made, showing the items having the five highest loadings for each of the six factors for each of the 10 groups. Patterns indicating identical factors were almost impossible to discern by this method. Hence, resort was again had to a further application of factor analysis with a view to seeing whether or not there were super-factors cutting across the various ethnic-cultural groups.

The separate analyses had resulted in 10 six-factor orthogonal solutions based upon the phi coefficients among the 75 items. Orthogonal rotation was selected with a view to possible reduction of problems inherent in correlated factors within each subsample. On the other hand, when this method later was tried for the three-grade solutions, after the analysis based upon correlations of obliquely rotated factors had been completed, the solution on the whole was less satisfactory.

Many negative factor loadings remained even after appropriate reflection of factors having a majority of negative loadings. This suggested that some of the super-factors that might be obtained by factoring the correlations among the initial factor loadings for the six factors for each of 10 groups might be most meaningful if bipolar super-factors were accepted. Indeed, this possibility was fully explored during many hours of arduous work. It was finally rejected--at least as far as this report is concerned--for two reasons. With the time and resources available, problems were insurmountable in trying to interpret bipolar super-factors.

A second reason for rejection of bipolar super-factors at this stage of the development of the test was that logically they would have implied different scoring keys for the several subsamples. One response on a particular item would have been credited with a point for some of the subsamples, whereas the alternative response would have been awarded a point for other subsamples. Perhaps this is the way it has to be, eventually. But one of the major purposes of this venture into trying to test the motivation of preschool children to achieve in school is to discover whether a single test can be serviceable. For this reason, combined with the formidable analytical problems, bipolar factors have been put aside for the present.

Awaiting output of computing equipment, the investigators used various inspectional and tallying devices in an effort to anticipate super-factors that might emerge. Although such visual perusal of the 10 six-factor solutions produced some hints as to the composition of two or three super-factors, no assurance of the validity of interpretations was possible with such a plethora of numbers to compare and contrast.

When an orthogonally rotated solution for six super-factors, based upon factoring the intercorrelations among the 10 sets of six factor loadings, was available, it, too, presented problems. Because ethnic-cultural differences had been expected, however, these difficulties were no cause for surprise. In a first approach to identification of super-factors based upon this factorization, an effort was made to locate for each of a possible six super-factors one of the initial six factors for each subsample that would have (a) the highest loading on that super-factor for the subsample and (b) coincidentally, the highest loading for that factor among all of the six initial factors. In this first approach, high negative loadings were accorded equal status with high positive loadings. One problem was that the initial factors did not behave in a completely orderly way. This is not surprising, because of general problems in factor analyses of binary data and the small numbers of cases for some subsamples. In addition, the complexities of interpreting "double-negatives," coupled with an aim to have one scoring key rather than 10 different ones, led to the seeking of a super-factor solution that depended only upon positive loadings on super-factors for the 60 initial factors. The anticipated outcome was that some super-factors would not be represented for some of the subsamples if only highest positive loadings in both directions were admitted. This forecast proved to be correct.

For every super-factor, a highest positive loading for both dimensions was sought. If such a loading was not available or if instead a high negative loading asserted itself, note was taken. The listing of subsample factors to define each super-factor, however, was based only upon positive loadings. Hence some subsamples were not represented on some super-factors. And, for some super-factors, a particular subsample may have had its highest initial factor loading (i.e., for the row) on some other super-factor, even though the column loading for that factor was the highest among the six loadings in the column. In such a case, the subsample initial factor was not included for the super-factor. Any one initial subsample factor thus was regarded as contributing to only a single super-factor--this despite the fact that in several cases the question of assignment of initial factors to super-factors was debatable.

The separate six-factor solutions, each for one of the 10 subsamples, are not presented herein.* The first six-factor, super-factor solution is given, however, in Table 6.5; it is followed by a summary of the factor numbers and super-factor loadings for each subsample group in Table 6.6.

One strongly represented super-factor, identifiable for all 10 groups (super-factor I), was associated with 19 items. A second, less compelling, was also represented for all groups, and it had 14 items loaded on it (super-factor II). A third, III, which was associated

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*Had this course been chosen, our able secretaries might be with us no longer.

## TABLE 6.5

### Orthogonally Rotated Factor Loadings on Six "Super-Factors" of the Six Initial Orthogonally Rotated Factors for Each of Ten Subsamples (Based on 75-item Gumpgookies)

| | | Super-Factor Loadings | | | | | |
|---|---|---|---|---|---|---|---|
| | Initial Factor Nos. | II (1) | I (2) | III (3) | V (4) | IV (5) | VI (6) |
| Mexican-American | 1 | -.75 | -.14 | .04 | .28 | -.06 | -.07 |
| | 2 | .12 | .49 | -.56 | .20 | .04 | -.03 |
| | 3 | -.64 | .20 | .12 | -.32 | .03 | .03 |
| | 4 | .02 | -.36 | .10 | .02 | -.22 | -.13 |
| | 5 | .36 | .07 | .66 | -.04 | -.09 | .38 |
| | 6 | .47 | -.13 | -.30 | .06 | .14 | -.22 |
| Negro (Urban) | 7 | .65 | -.08 | .22 | .04 | -.05 | .31 |
| | 8 | -.09 | .53 | .11 | .22 | .26 | .06 |
| | 9 | -.36 | -.39 | .07 | -.46 | .07 | .12 |
| | 10 | .04 | .02 | -.41 | .40 | .02 | -.03 |
| | 11 | -.24 | .13 | -.33 | .09 | -.03 | .29 |
| | 12 | .15 | .32 | .18 | -.06 | -.13 | -.09 |
| White (Rural) | 13 | .40 | .38 | .12 | -.18 | .13 | .15 |
| | 14 | -.45 | -.07 | .22 | -.19 | .36 | .09 |
| | 15 | .08 | -.03 | .15 | .46 | .31 | -.15 |
| | 16 | .09 | .59 | .04 | .02 | .07 | .08 |
| | 17 | -.14 | .10 | -.09 | .04 | -.16 | .50 |
| | 18 | -.17 | .05 | .34 | .15 | .21 | .19 |
| Oriental (West Coast) | 19 | -.01 | -.02 | -.09 | .12 | -.37 | .43 |
| | 20 | -.38 | -.09 | -.03 | .03 | .10 | -.27 |
| | 21 | .41 | .46 | -.03 | -.25 | .05 | .01 |
| | 22 | .02 | -.14 | .08 | .01 | .13 | .31 |
| | 23 | .18 | -.47 | .13 | -.09 | -.02 | -.05 |
| | 24 | .28 | -.04 | -.41 | .03 | .14 | .18 |
| American Indian | 25 | .45 | .05 | .42 | -.06 | -.25 | .30 |
| | 26 | -.66 | .06 | -.00 | -.03 | -.01 | .11 |
| | 27 | .13 | .10 | -.35 | .29 | .53 | .04 |
| | 28 | .06 | .37 | -.30 | -.25 | -.12 | .12 |
| | 29 | .12 | .47 | -.12 | -.10 | .16 | -.17 |
| | 30 | .50 | .08 | -.00 | .01 | -.12 | -.17 |

TABLE 6.5 (cont.)

| | | Super-Factor Loadings | | | | | |
|---|---|---|---|---|---|---|---|
| | Initial Factor Nos. | II (1) | I (2) | III (3) | V (4) | IV (5) | VI (6) |
| Mormon | 31 | -.10 | .56 | .26 | -.06 | -.15 | .05 |
| | 32 | -.33 | -.10 | .05 | -.39 | .35 | .42 |
| | 33 | -.12 | -.24 | .23 | .16 | -.24 | .20 |
| | 34 | -.00 | .07 | -.21 | .53 | .06 | .06 |
| | 35 | .69 | .16 | -.01 | -.09 | .14 | .07 |
| | 36 | -.01 | -.08 | .05 | -.09 | -.58 | -.18 |
| Catholic | 37 | .28 | .52 | .29 | .15 | -.32 | -.06 |
| | 38 | -.57 | .12 | -.07 | -.17 | .09 | .00 |
| | 39 | .31 | .07 | .02 | -.50 | .33 | .24 |
| | 40 | .46 | .02 | .18 | .22 | .20 | -.14 |
| | 41 | -.23 | -.32 | .02 | .11 | -.03 | -.46 |
| | 42 | .28 | .14 | -.05 | .43 | .07 | .45 |
| Jewish | 43 | .18 | .10 | .08 | -.12 | .07 | .66 |
| | 44 | .01 | .60 | -.41 | .06 | -.02 | -.16 |
| | 45 | -.02 | -.25 | -.08 | .72 | .02 | .17 |
| | 46 | -.61 | -.02 | .05 | -.13 | -.22 | -.08 |
| | 47 | -.12 | .05 | .26 | -.17 | .57 | -.14 |
| | 48 | .56 | .23 | .38 | -.21 | -.17 | .13 |
| Hawaiian | 49 | .70 | -.04 | .12 | .19 | -.25 | .24 |
| | 50 | -.08 | .32 | -.36 | -.14 | .13 | .04 |
| | 51 | -.14 | .45 | .23 | .12 | -.00 | .30 |
| | 52 | .09 | -.18 | .62 | -.14 | -.19 | .10 |
| | 53 | .38 | .02 | -.17 | -.10 | .56 | -.24 |
| | 54 | -.44 | .28 | .19 | .31 | .11 | -.07 |
| Puerto Rican | 55 | .32 | .11 | .55 | -.16 | .24 | .15 |
| | 56 | -.20 | .47 | -.33 | -.07 | .10 | .09 |
| | 57 | .24 | -.13 | .20 | -.22 | -.55 | -.00 |
| | 58 | .34 | .06 | .14 | .46 | -.12 | .01 |
| | 59 | .06 | -.09 | -.53 | -.07 | -.09 | .11 |
| | 60 | -.45 | .11 | -.12 | .06 | -.09 | -.43 |
| **Eigenvalues** | | 7.79 | 5.07 | 4.16 | 3.17 | 2.73 | 2.52 |

## TABLE 6.6

### Initial Factor Numbers for the Positively Loaded Factors Associated With Each Super-Factor for the Ten Subsamples, Together With the Loadings on the Super-Factors

| | I | | II | | III | | IV | | V | | VI | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mexican-American | 2 | .49 | 6 | .47 | 5 | .66 | | | | | | |
| Negro (Urban) | 8 | .53 | 7 | .65 | | | | | 10 | .40 | 11 | .29 |
| White (Rural) | 16 | .59 | 13 | .40 | 18 | .34 | 14 | .36 | 15 | .46 | 17 | .50 |
| Oriental (W. Coast) | 21 | .46 | 21 | .41 | | | | | | | 19 | .43 |
| American Indian | 29 | .47 | 25 | .45 | 25 | .42 | 27 | .53 | | | | |
| Mormon | 31 | .56 | 35 | .69 | 31 | .26 | | | 34 | .53 | 32 | .42 |
| Catholic | 37 | .52 | 40 | .46 | | | 39 | .33 | | | 42 | .45 |
| Jewish | 44 | .60 | 48 | .56 | | | 47 | .57 | 45 | .72 | 43 | .66 |
| Hawaiian | 51 | .45 | 49 | .70 | 52 | .62 | 53 | .56 | | | | |
| Puerto Rican | 56 | .47 | 57 | .24 | 55 | .55 | | | 58 | .46 | | |

with 14 items, was present for six groups, excluding urban Negroes, Catholics, Jews, and West Coast Orientals. Super-factor IV, associated with 10 items, was based on positively loaded factors for five groups, excluding urban Negroes, Mexican-Americans, Puerto Ricans, Mormons, and West Coast Orientals.

The remaining two super-factors, V and VI, could be associated with too few items to permit their identification. Hence, especially in view of an improved solution that became available later, their interpretations were not pursued.

Even with the three fairly strong super-factors revealed by this approach, conclusions are provisional, attempting to take into account different representations of the various subsamples as well as contrasts with the super-factors obtained for older children in school grades 1, 2, and 4 in Hawaii only, as described in the following section.

That the composition of the initial motivational factors for different ethnic-cultural-economic groups should differ is no cause for surprise or disappointment. Nor could one expect that life in complex and different environments would be so simple that factors comprising motivation to achieve in school would remain the same for children of different age groups. Especially would there be small likelihood that the factorial composition of the test would be the same for children of preschool age as for children in regular school attendance in grades through the fourth. Presumably, or perhaps even ideally, the interpretations of factors would be more general or undifferentiated for preschool children and could become more specific for older children.

It may be mentioned at this point that the initial intent of the very extensive factorial analyses of the test results for different subsamples of the same age and for different age groups has not been to obtain scores on separate factors. Rather, the purpose has been to gain insight into the constituents of motivation for children of different backgrounds and different ages, and thereby to foster increased understanding and subsequent fruitful research on ways to increase motivation. Nevertheless, scores on separate factors comprising motivation to achieve appear now to represent an ultimately attainable goal.

## Comparisons of Initial Super-Factors for the Three Grade Groups and the Ten Ethnic-Cultural Groups

Although overlapping of the initial super-factors for the 10 subsamples of younger preschool children (mean age 58 months) and those obtained for Hawaiian children in the first, second, and fourth grades is far from one-to-one, nevertheless there are resemblances. Table 6.7 shows the relation of the initial super-factors for the 10 groups of preschool children with those for the three elementary school groups. It also shows with which super-factor, if any, each of the 75 items was associated. The strongest four super-factors in each set have 38 items (out of the possible 75) in common. The comparisons will not be pursued in detail, because of more promising results of a different methodology, to be presented later in this chapter.

Super-factor I, the strongest, has four items in common with super-factor A, identified as self-confidence in ability to excel; four items in common with super-factor B, identified as work enjoyment; and five items in common with super-factor C, identified as instrumental activity. Super-factor II also has items in common with super-factor A (self-confidence) and C (instrumental activity). Super-factor III has appreciable positive loadings for six subsamples. It does not have

TABLE 6.7

Relation Between Two Initial Super Factor Solutions, With Associated Numbers of Items

| Initial Super-Factors for 10 Groups of Preschoolers | Initial Super-Factors for Grades 1, 2, 4 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | A | B | C | D | E | F | None | No. items |
| I | 4 | 4 | 5 | 1 | | | 5 | 19 |
| II | 2 | | 4 | 2 | 2 | 2 | 2 | 14 |
| III | 2 | | 5 | 2 | | 3 | 2 | 14 |
| IV | | 5 | | 2 | 2 | 1 | | 10 |
| V | | | 1 | | 1 | | 3 | 5 |
| VI | | 1 | | 1 | 1 | | 1 | 4 |
| None | 2 | | 2 | 2 | | 1 | 2 | 9 |
| No. items | 10 | 10 | 17 | 10 | 6 | 7 | 15 | 75 |

appreciable positive loadings for the Negro (urban) nor the small Oriental (West Coast) sample, and its loadings for Mormons and Catholics are not high. Its items stress trying to do well, continuing with a task, trying to write, liking to tell stories versus listening, counting flowers, getting smarter versus tired when counting.

Super-factor IV appeared at first inspection to be concerned with positive orientation toward school. It has high loadings for six items associated with super-factor B, interpreted for the sample of first-, second-, and fourth-graders as work enjoyment. In the course of attempts to interpret super-factor IV in relation to super-factor B, it became apparent once more that at this level of analysis influences of answer position, item position in the test, or primacy versus recency as to order of presentation of alternatives, or combinations of such influences, were affecting the factors. Although such possibilities had been explored for each subsample factor analysis and no compelling evidence presented itself, when super-factor IV was compared with super-factor B and the items selected on the basis of all data to identify these factors were examined, it became clear that both super-factors tended to be loaded with items in which the keyed answer was presented first. For the 10 items in the 75-item form that were loaded on super-factor B, seven reflect influence of primacy. There were, however, 38 items that could have pulled together on one factor if this were the only influence. Likewise, for super-factor V, although eight of the 10 items identifying the factor reflected primacy, again 38 items could have shown this effect but did not.

Since after this analysis had been done it became apparent that factoring the correlations based on the 10 groups combined would be more promising, no further attempts were made to interpret the content of these initial super-factors.

## An Improved Approach to Super-Factors for Grades 1, 2, and 4

It had become apparent that a more clear-cut approach to super-factors might be to factor a matrix of phi coefficients computed for all relevant groups combined. Accordingly, a factor analysis based upon the combined samples of first-, second-, and fourth-graders in Hawaii was done. The rotation specified was orthogonal, with again six factors to be extracted.

This solution on the whole confirmed the super-factors previously discussed and yielded a structure that seemed more clearly interpretable than that previously available from the factorization of the correlations among factor loadings for the three grade groups.

As before, a super-factor, A', strongly identified as concerned with excellence and having 23 items associated with it was manifest. It can be interpreted as self-confidence in ability to achieve. The individual with a high score on this factor sees himself as a high achiever. The most heavily loaded items reveal no recency influence, though it shows up when the less strongly loaded items are added. This recency effect is perhaps interpretable as a tendency to withhold response until both gumpgookies for each item have been described. The most heavily loaded items, however, which emphasize being the best in the class, being better than others, being able to write just like teacher, knowing more than others, and winning a running race, do not reflect a recency effect. The items associated with this factor were scattered over the test, from item six to 95.

A second clear super-factor, B', which on the basis of the earlier analysis was thought possibly related to general work orientation, is more definitely associated with work enjoyment. It involves positive affect toward work. Among its 17 items, those that do not explicitly mention school or learning or studying nevertheless depict work, with few exceptions. This super-factor, like A', was scattered over all items (from item five to 92). Although among the highest six loadings five reflected primacy, only six of the top 10 and nine of the top 17 revealed this tendency. Hence it is concluded that this factor is not dominated by primacy or recency influences. Nor does it appear to be affected by position preferences.

A third strong super-factor, C', which is associated with 23 items, is interpreted as involving instrumental activity. The items loaded on it suggest initiative--being active or eagerly ready to engage in activity, energetic, not tired, able to do something, willing to try. Subsequent analyses, factor by factor and item by item, suggest that, although there is adequate reason to describe such a factor, it can reasonably be presumed to manifest itself through some different activity preferences for different age groups. Hence different items for the three groups are loaded on the factors that have loadings of .35 or above for the super-factor.

Two characteristics could not escape notice. The first is that the items loaded heavily on this factor tended to be those in which the keyed answer was read first. This suggests that the child motivated to be active and energetic tends to make a decision quickly--to choose the answer that he first hears described by the examiner.

Another striking finding was that, among the 23 items that could be uniquely assigned to this factor, 19 were in the last half of the test of 100 items and 12 (or over 50%) were in the last quarter. This was not the first time in this investigation that a factor apparently had been associated with position of items in the test. And the hypothesis of persistence to account for factors heavily loaded with items toward the end of the test had been discussed many times. In this instance, the hypothesis of instrumental activity had been educed from the content of the items before their positions in the test had been examined. Nevertheless, the reality of the finding of higher loadings for items toward the end of the test is inescapable, and it is suggested that this tendency lends confirmation to the interpretation of the factor as persisting in initiating goal-directed activities.

Super-factor D', with 12 items, is not so strong as are A', B', and C'. As was found for super-factor D, its items suggest orientation to future goals, identification with a model, awareness of future implications, and delayed gratification. It is tentatively interpreted as responsiveness to future goals. It shows no answer-position effects but a tendency toward primacy effects. Eight of the 11 items ascribed to this factor are in the first half of the test. For a normal curve approximation to the binomial with $n = 11$ and $p = .50$, the $z$ value corresponding to 7.5 is 1.21. Hence the finding is not inconsistent with the chance hypothesis.

A fifth super-factor is designated E'. It is not particularly associated with super-factor E, based upon factoring correlation coefficients among factor loadings for the separate analyses for the three grade groups. The major emphasis of the 13 items assigned to this factor is on quality of work versus amount--doing work right versus a lot, doing well versus a lot, always doing one's best, getting problems right versus doing many, thinking versus watching, thinking versus waiting. This factor is about equally evident for the three different grade groups. Its items imply an internal standard of excellence--the ability to evaluate one's own work. It will be referred to as self-evaluation, an ethical component of motivation.

There is some evidence of a possible primacy influence, for all five of the top five items and nine of the total 13, and rather less evidence for a possible preference for the down versus up answer position.

Super-factor F' has loadings for too few items (six) to warrant firm interpretation. The items, though few in number, seem to emphasize self-reliance and dependability.

Six items were perhaps not legitimately assignable to any of the six super-factors, though they were placed with the super-factor on which they had their highest positive loading.

### Comparisons of Factors for Grade 1, Grade 2, Grades 1 and 2 Combined, and Grade 4 with the Super-Factors for Grades 1, 2, and 4

In a somewhat different look at the super-factors for the elementary school children, items in the 100-item forms were first assigned to one of six super-factors based upon analysis of the three grade groups combined. Each item was assigned to the factor with the highest positive loading. For each factor, the items were listed in order of loading. Then separate recordings were made to show on which factor for four additional analyses each item had its highest loading: for first grade alone, second grade alone, first and second grades combined, and fourth grade alone.

For the items also included in the 75-item form used for the 10 ethnic-cultural groups, again recordings were made to show on which factor for each of the 10 separate analyses each item had its highest loading.

Super-factor A', interpreted as self-confidence in ability to achieve, was equally clear for grades 2 and 4 and almost as strong for grade 1. Its identification is in little doubt, with 21 items loaded .33 or higher. No one of the 10 groups of younger children had the items on this super-factor concentrated on a single factor. Rather, the items were scattered over several factors.

Super-factor B', work enjoyment, was most strongly identified for second-graders. For first-graders, the items for B' tended to be divided between two factors rather than falling on a single one. For the combined first- and second-graders, nine of the top 10 B' items were on a single factor, and nine of the 10 B' items were on a single factor for grade 4. It appears that first-grade children have not yet developed as strong a positive orientation toward work as second-graders. Perhaps fourth-graders already have tended to become disenchanted with school and hence with work. Comparisons of scores on this factor for the three groups might shed some light on this finding.

Super-factor C', related to activity, shows up most clearly for grades 1 and 2 combined. For grade 1, some of the C' items are more highly loaded on the factor related to work enjoyment. However, 19 of the top 20 items on C' could be regarded as having at least possibly significant loadings on a particular grade 1 factor, even though four had higher loadings on a second grade 1 factor. For grade 4, eight of the top 13 C' items were associated with a single factor. Some of the

C' items are not very appropriate for fourth-graders (i.e., needs help in dressing versus dresses itself, mad at itself because it can't write its name).

There is definite overlap though not complete identity between C' and a super-factor based on analyses for the 10 groups of younger children. When the factors were tallied with respect to the items of C', the groups most clearly having a single one of their respective factors associated with C' items were, in order: Jews; Hawaiians and Mexican-Americans (about equal); American Indians; Catholics; rural Whites, urban Negroes, and Mormons (about equal); Puerto Ricans.

Curiously, for a group of four items with moderately high loadings on C', three of the analyses for younger children show a shift from the factor associated with the still higher loadings on C'. These three groups are the Hawaiians, Mormons, and rural Whites. For these groups, the initial factors in question are associated primarily with super-factor II, whereas the initial factors that go with the more highly loaded C' items appeared mainly on super-factor III.

Factor D', a super-factor not so clear as A', B', and C', tentatively interpreted as responsiveness to future goals, appeared to be more definitely associated with a single factor for first-graders and for fourth-graders than for second-graders. However, it was primarily associated with a single factor for grades 1 and 2 combined.

Factor E', interpreted as self-evaluation, was perhaps most clearly identified for grade 2 among the three separate grade groups, though it is equally clear for grades 1 and 2 combined. For grade 4, the super-factor E' items seem to split mainly into two factors instead of staying together on a single one. This finding will require further study.

Super-factor F', with only six items and only two of these having loadings above .30, is not strongly enough identified to be interpreted with any confidence. Self-reliance or dependability were suggested. Nevertheless, five of the six items were together on a single factor for grade 1 and for grades 1 and 2 combined. Items on both D' and F' tended to be associated with the same factors for first-graders and for first- and second-graders combined. Perhaps this has some relation to the fact that for the first two grades the D' items reveal some tendency toward a primacy effect, the F' items some tendency toward a recency effect.

### Comparisons of Five Super-Factors for Grades 1, 2, and 4 With Three Super-Factors for the Ten Ethnic-Cultural Groups

Because it had seemed possible to interpret five factors for the school-age children and fewer for the preschoolers, it was decided at one point to examine an obliquely rotated, five-factor solution for all of the older children and an obliquely rotated, three-factor solution for all of the preschoolers. There was then a possibility that second-order analyses might be enlightening, especially in relevance to the development of motivational factors.

Somewhat disappointingly, the factors yielded by this approach were not so clear-cut as those resulting from six-factor solutions. Moreover, possible answer-position effects appeared more prominently for the younger group, one factor having answers for the most part up or left, one up or right, and one down; and recency or primacy influences seemed evident for three of the five factors for the older group.

A double-entry table showing the congruence of items in the 15 cells associated with this approach again confirmed the troublesome role particularly of answer-position effects but also of primacy-recency influences, though to a lesser extent.

Without presentation of the details involved in inspecting many numbers and much clerical work that transpired, the conclusion is presented that this resort to a smaller number of factors served only to intensify problems of interpretation of factors and their relations for the two groups.

*A second-order analysis of the five super-factors for grades 1, 2, and 4*. Before discussion of this particular phase of the analysis is abandoned, however, mention will be made of some interesting results of a second-order analysis of the correlations among the five oblique factors for the total school-age group. Factors 1 and 3 had loadings of -.92 and .83 on a bipolar second-order factor. Factor 1 may have been affected by recency, 3 by primacy. But factor 2 also was probably affected by primacy and has a loading of -.03 on the factor. Hence the contrast is not that of primacy versus recency.

If the interpretations of the factors--*self-confidence* and *self-evaluation*--have any validity, then it seems to make sense that they are at opposite poles. The person who is highly self-confident is not one given to self-evaluation. Note, also, that the first-order factors were negatively correlated, -.60.

For the second second-order factor, factors 2 and 4 were highly loaded--.80 and .74, respectively. These were factors interpreted as related to activity, perhaps *instrumental activity*, and to *work enjoyment*. Factor 5, which in this five-factor solution had no clear interpretation, was loaded .40 on this second-order factor. Factor 5 had only a small number of items with high loadings. They are suggestive of concern for adult approval of one's own achievements, although such an interpretation was by no means over-determined. The high loadings of factors 2 and 4 suggest constructively-directed energy, initiative, and perhaps compulsivity.

## Comparison of Six Improved Super-Factors for Grades 1, 2, and 4 With Six Improved Super-Factors for the Ten Ethnic-Cultural Groups

The final comparisons of factors to be presented were based upon two orthogonally rotated, six-factor solutions--for all of the 668 Hawaiian children in grades 1, 2, and 4 combined and for all of the 1,607 children in the ethnic-cultural samples combined.* The former analysis has been discussed previously (pp. 103-106).

When the question of comparing factorial solutions based upon different groups (by age or ethnic-cultural backgrounds) was first considered, attention was directed by Paul Horst to a technique developed by Bruce Bloxom for rotating to maximally similar solutions for a number of groups (Bloxom, 1968). Since one of the purposes was to look at inter-group differences as well as likenesses, however, a solution that would maximize similarities appeared to be logically indefensible. Hence an alternative suggestion of Horst, to factor correlations among factor loadings for different groups, at first was adopted. The super-factors that resulted from this technique have been discussed earlier in this chapter. The approach still seems to have much to commend it when the purpose is to survey group similarities and dissimilarities, but the more recent comparisons of factorizations based upon combinations of subjects has seemed even more fruitful.

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*Under the influence of arguments on both sides, both orthogonal and oblique rotations have been used. Although the authors' bias is towards oblique solutions, for strong factors it does not seem to make a lot of difference which type of solution is used.

At this point, the rationale for putting the groups together in the way in which they were combined warrants repetition. Although children of different ethnic-cultural groups and children of different ages surely differ in motivational factors, some bases by which to compare the different groups are needed. Hence the approach of this series of analyses has emphasized attempts to identify factors by means of which subgroups eventually could be compared.

The authors are not unaware of other approaches to estimating the congruence of factors (e.g., Barlow & Burt, 1954; Wrigley & Neuhaus, 1955; Cattell, 1969). A prior concern, however, has been to define two sets of factors with which various solutions can be contrasted. Later, the results of the numerous factor analyses that have been made can be compared systematically with the defined super-factors. At this point, enough comparisons have been made to justify an assertion that the various subgroups do indeed differ in the factorial composition of the test, as was to be expected.

It will be recalled that the five most clearly identified super-factors for combined first-, second-, and fourth-graders were

A', Self-confidence, a conceptual response;
B', Work enjoyment, an affective response;
C', Activity, possibly instrumental activity, a cognitive response, i.e., knowing what action to take;
D', Responsiveness to future goals, a purposive response;
E', Self-evaluation, an ethical response.

The possibility also exists that F' represents dependability or self-reliance, though it has only six items loaded on it and only two loadings of .30 or higher.

It may also be noted that A' is affected to some extent by recency and C' by primacy, as mentioned earlier. The other factors for the older children do not show such effects; nor, as a whole, do the factors show answer-position effects.

For the total group of 1,607 preschool children, the following factors are very tentatively identified:

1. General constructive activity
2. Self-evaluation
3. Optimistic self-confidence
5. Persistence
6. Work enjoyment

Factor 4, although it has 11 items loaded on it, is not yet clear. Further study is needed with respect to all of these factors for the younger children and to their relation to factors that can be identified for the separate ethnic-cultural groups.

These factors for preschoolers are still affected by irrelevant influences, although fairly clear interpretations on the basis of content seem to be possible. Factor 1 tends to have answers in the left and up positions, with primacy influences. Factor 2 tends to have answers in the down position, with nine of its 10 items in the first two-thirds of the test. Factor 3 items tend to have answers in the right and up positions. Factor 4 answers tend to be up, factor 5 answers down and, to a lesser extent, left, with more recency items than primacy and five of its six items in the _last_ half of the test. Factor 6, one of the two most prominent factors (along with 1) tends to have answers that are down and to a lesser extent left, with nine of its 10 items in the first half of the test.

From the factorial findings for the randomized form as well as those for the original format of the test, the investigators are convinced that the effects of answer position, primacy versus recency, and item position upon the factors are genuine and not to be solely attributed to chance. In some of the simpler cases, straightforward statistical tests seem appropriate and yield conclusions that the effects in question are statistically significant, with $p < .05$ or $p < .01$. In other more complicated cases, especially those seeming to involve a preference for one of two or three answer positions, where this preference is observed on an *a posteriori* basis, there is still some uncertainty as to how the statistical significance should be determined. One proposed method of computing a p value in such instances appears likely to be quite time-consuming, especially when the frequencies of the different answer positions in the population of such positions, i.e., in the scoring key, differ. Despite the fact that the computations that may be necessary for such cases have not been made, the observed phenomena are in some instances too prominent to be dismissed as attributable to chance. On the other hand, there is also persuasive evidence from divergent sources that the test and at least some of the factors are measuring sources of variance other than artifacts or extraneous influences.

Table 6.8 summarizes the relations among these two sets of factors, not by item numbers but by numbers of items, since the interpretations, especially for the younger age groups, are still tentative and since a copy of the test will not be available to every reader. It should be remembered that the interpretations of the factors for the older groups were based upon more items, since they took a 100-item form instead of the 75-item form that the preschool children took. An additional fact that has complicated interpretation is that the fourth-grade children read the items for themselves, so that the primacy-recency determination for each item had to be made separately for the first- and second-graders and the fourth-graders.

TABLE 6.8

Relation of Orthogonal Six-Factor Solution for
Grades 1, 2, and 4 (N = 668) and Orthogonal
Six-Factor Solution for Ten Ethnic-Cultural
Groups (N = 1,607)

| Factors for 10 Ethnic-Cultural Groups | | Factors for Grades 1, 2, 4 | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Self-confidence | Work enjoyment | Instrumental activity | Future goals | Self-evaluation | Self-reliance | |
| | | A' | B' | C' | D' | E' | F' | No. items |
| General activity | 1 | 1 | 2 | 8 | 4 | 1 | 1 | 17 Left (Up)<br>Primacy |
| Self-evaluation | 2 | 3 | 1 | 1 | 3 | 3 | 0 | 11 Down<br>(9 items in first two-thirds) |
| Optimistic self-confidence | 3 | 4 | 2 | 7 | 3 | 2 | 2 | 20 Right (Up) |
| ? | 4 | 4 | 2 | 3 | 1 | 1 | 0 | 11 Up |
| Persistence | 5 | 2 | 1 | 3 | 0 | 0 | 0 | 6 Down (Left)<br>Recency<br>(5 items last half) |
| Work enjoyment | 6 | 0 | 6 | 1 | 1 | 2 | 0 | 10 Down (Left)<br>Primacy<br>(9 items first half) |
| No. items | | 14<br>Recency | 14 | 23<br>Primacy | 12 | 9 | 3 | 75 |

## Hypotheses Concerning Answer-Position, Item-Position, and Primacy Versus Recency Influences

Some general and quite tenuous hypotheses will be advanced as possible explanations for effects of answer positions, item positions, and primacy versus recency.

First, it should be noted that the question of right- versus left-handedness of the subjects in relation to preferred answer positions has not yet been explored in the course of these studies. It may be that right-handed children tend to take answers to the right and left-handed children answers to the left. Data on handedness are being collected for the children taking the Gumpgookies test in the fall of 1969 and thereafter, so that this question can be studied.

In these studies, the answer-position problem has been more strikingly manifest for the preschool groups than for children of school age. For the former group of 10 subsamples, super-factor 3, interpreted as optimistic self-confidence, was found to have a very large percentage of answers in the up or in the right position. This suggests that optimism goes with "upness," an explanation that at first thought seems too simple but that may nevertheless warrant further scrutiny. It is also possible that handedness was having an effect.

A tendency to take the left-hand answer, aside from its possible relation to handedness that remains to be studied, may reflect the western cultural pattern of reading--hence looking--from left to right, even for pre-readers. Many of them, even those who come from impoverished families, will have had this tendency implanted. Granted such a tendency, perhaps the child oriented to activity for the sake of activity, the one who wants to "get going," the one who prefers a rapid to a slow pace, tends to choose the gumpgookie that he naturally looks at first. This hypothesis gains credence through the finding of items tending to have answers in the left and up positions on super-factor 1, that interpreted as related to activity in the analysis based on 10 groups of preschoolers. The same tendency toward the left-hand answer position is also evident in super-factor C' for the elementary school groups, also interpreted as related to activity. These two factors have eight items in common.

Factor 5, interpreted as willingness to persist to attain excellence, showed some trend toward down answers. If a tendency to look at things from up to down is accepted, a delay in decision as to which response to choose might lead to a preponderance of down answers. This explanation seems consistent with the interpretation of the factor as involving persistence. Four of the six items were associated with recency, two with primacy.

Factor 2, interpreted as self-evaluation, also has more items with answers in the down position. This may reflect an attitude of carefulness in approaching the test task.

The effects of primacy versus recency, with respect to which answer is read first, have also been studied. It must be remembered that fourth-graders read the items for themselves, so that interpretation of which items reflect recency differs for them and the combined first- and second-graders.

Super-factor A', interpreted as confidence in ability to achieve, seems to reflect a recency effect for the younger group but not for the fourth-graders. Perhaps this recency effect reflects a postponement of answer choice until both descriptions are available to the child. It may be that the child in this age group (six to eight) who is concerned with winning and who identifies with excellence tries to exercise care to see that he does win or excel. Super-factor 3, also interpreted as involving self-confidence for the Head Start children, is almost equally divided between primacy and recency effects, but shows a preponderance of items with answers to the right. This tendency also could be associated with care if the child tends to look first at the left-hand picture.

On the other hand, super-factor C', interpreted as related to instrumental activity, reflects a possible primacy effect for the first- and second-graders, as does super-factor 1 for the combined Head Start groups. The items reflect activity and energy, not careful attention. Thus it may be that the child who seeks activity, who likes to be doing a variety of things, who prefers a rapid pace, tends to select the first alternative described to him so that he can the more quickly get on to the next one.

Aside from super-factor 1, no strong tendencies toward primacy or recency effects were evidenced for the super-factors based upon the 10 subgroups of preschoolers, although there is a possibility of a primacy influence for super-factor 6, work enjoyment. Such effects may be present for some of the subgroups and not others. This question can be explored more fully at a later time. In the meantime, the hypotheses developed above should be regarded as highly tentative.

## Additional Work Needed

The separate factor analyses for the 13 subgroups and certain combinations of them warrant more intensive effort. Although the results were used extensively in the initial attempts to arrive at super-factors, work concentrated on interpreting the many factors was not systematically undertaken.

Further study of the characteristics of each item assigned to each of the relevant "improved" super-factors (A', B', C', D', E', F', 1, 2, 3, 4, 5, 6) should be made for each of the 13 subsamples (the three elementary school groups and the 10 ethnic-cultural groups). At this stage of a series of studies, effort has been concentrated on likenesses across groups rather than on the differences that are evident. These differences should constitute the focus of some further work.

It should also be of value to obtain approximate factor scores for the more clearly interpretable factors and to compare the various subgroups on the several factors. No attempts in this direction have been made as yet. Despite the "noise" associated with extraneous influences--which, incidentally, must affect other tests for young children as well as Gumpgookies--, the factors seem worthy of further pursuit. Chapter 8 will offer some suggestions as to additional types of analyses that will help to clarify the extent of the effects of unwanted influences as distinct from those of item content per se.

# CHAPTER 7

# EXPLORATIONS IN TEACHING PRESCHOOLERS MOTIVATION TO ACHIEVE

The theoretical orientation for this research defines motivation to achieve as a combination of learned responses. It further suggests that if these response constituents are learned, then they may be modified by manipulation of causal determinants in accordance with principles of learning. The implication of this suggestion is that motivation to achieve can be increased in the classroom by control of appropriate determining variables.

## Operant Conditioning of Questioning

Early in the research reported herein, exploratory work began to identify classroom variables that could be manipulated to teach preschoolers motivation to achieve. A preliminary study attempted to apply operant procedures to condition questioning, an instrumental behavior that may facilitate individual initiative in learning. Conditioning took place in individual sessions in which a stimulus was presented and reinforcement was contingent upon the child's asking a question about it. The stimuli changed sequentially across sessions from concrete objects to abstract words. The reinforcement also changed sequentially across sessions from edible candy to abstract information, i.e., the answer to the question.

Seventeen four-year-old children were randomly divided into two groups. The first group (N = 12) underwent operant conditioning for questioning behavior with reinforcement contingent upon the child's improving his ability to ask well-formulated questions. The definition of what constituted a question varied among the children and with each child throughout the 10 sessions. In some instances, the experimenter was required to engage in extensive prompting, including the use of model questions; in others, she merely presented the stimulus and manipulated the reinforcement. For each child, however, reinforcement was administered for successive approximations to the desired questioning response. The second group (N = 5) completed six individual sessions with the experimenter. The stimulus, questioning, was neither modeled nor reinforced. This group was used in order to determine the extent of the effect of familiarity with the experimenter upon the child's questioning behavior.

In the initial sessions, neither group of children constructed well-formulated questions for any stimulus presented. A further comparison of the two groups indicated that the questioning behavior seemed to increase in quantity and quality only when operant conditioning and modeling were employed, although personality variables were influential in determining the spontaneity and ease with which questions were asked.

### A Curriculum To Teach Preschoolers Motivation To Achieve

The congruence of these and other similar results with the hypothesized model of motivation to achieve encouraged efforts to create a curricular design that would teach the response constituents of motivation to achieve. A preliminary curriculum of this nature was written and used in three Head Start classes during the school year 1968-69. Once each month, the staffs conducting the classes met for a discussion of the previous month's curriculum and of that for the ensuing month. This regular feedback from the teachers and from the classroom visits of the research staff was helpful in providing a basis for inclusion or exclusion of various ideas. While activities suitable for a four-year-old were essential, they had to dovetail with the underlying aspects of motivation that were being sought.

The curriculum was presented to the teachers in two sections. The first concentrated on the use of ongoing activities and the second consisted of additional, specified daily activities. The ongoing activities are considered to be by far the more important of the two in that they are attempts to direct the covert learning that occurs in the teacher-child interaction. The role of the teacher in modeling the desired responses, eliciting some approximation to them, and reinforcing such approximations requires a high degree of awareness and comprehension. It was thought that, through this subtle use of characteristically human models, stimuli, and reinforcement, learning of the covert expectations, concepts, and standards would be facilitated.

The specific activities were exemplary ways in which the teacher-child interaction was to have been capitalized on in the classroom. In addition, these activities were so structured as to insure each child the opportunity every day to make one of the covert responses and to be reinforced for having done so.

Both types of activities were highly individualized. Teachers were instructed to alter each activity to fit their own personality as well as the level of development and personality of the child. The illustrative curricular materials that follow are simply examples of basic elements of the activities, omitting the unique reactions and contributions of each teacher as she dealt with each individual child.

At the time the design of the curriculum was undertaken, motivation to achieve was conceptualized as having six identifiable types of response constituents: affective, conceptual, purposive, cognitive, ethical, and personal. The personal responses were thought of as attributable to separate personality characteristics that facilitate the expression of motivation to achieve. These characteristics have since been subsumed under the first five response categories.

Each unit of the curriculum was presented to the teachers in three sections: its rationale, a description of ongoing activities, and a number of suggestions for specific daily activities. Their treatment was sometimes varied, however, especially in the format of the curriculum itself. In the first two sections, the emphasis lay heavily upon the theory, with general activities being mentioned. The written material made available to the teachers served as a basis for discussion and also provided a document to which the teachers could refer. The units of the curriculum were modified and amplified in the course of the discussions.

Attempts were made to get the teacher to introspect and to analyze her reactions to children and to situations, lest there be unwitting obstacles to the rapport that was essential to the curriculum. The specific application, after the presentation of examples, was left to the teacher. In retrospect, the approach for these first two sections of the various units of curriculum appears to have been too individualized. The remaining section was more activity-oriented. The activities came under close scrutiny of the teachers. Their modifications and suggestions were in many instances adopted and their criticisms welcomed.

The following excerpts from the materials made available to the teachers will serve primarily to illustrate the types of ideas that were presented and discussed before attempts were made to apply them. For the first two units, an example of one of the specific activities that were suggested is shown.

## Unit I

## Affective Responses

### Rationale

Expectation of positive affect underlies all motivation of behavior. If a child expects that achieving in school will make him happy, he will possess one of the basic components of motivation to achieve in school. The ultimate goal of this unit of work is to begin to teach the child that he will be happy in achieving in school. Such an expectation of positive affect can be developed only gradually through specific types of experiences.

### Ongoing Activities

Teachers are concerned about their children. This concern is expressed through their active attention to the well-being and happiness of each child throughout each day. The communication of this concern to the children should be on a feeling level. Children have various needs and ways of expressing them. It is impossible to dictate how teachers can be aware of and meet these needs. If the teacher is truly concerned about her children, however, she will do everything she possibly can to try to meet their needs. The sincerity of her efforts to try is the most important aspect of her actions.

The positive affect which arises in a child when he feels that he is respected as an individual is invaluable. Teachers should treat each child with dignity and appreciation. Children are to be regarded as having potentialities that will not be reached without special efforts. If real respect exists for children, teachers will always honor their word to a child, speak to him at a challenging level, and prepare for the child as he would for an adult colleague.

During this unit, the emphasis is on a warm emotional climate. Teachers should do all they possibly can to eliminate unpleasant situations. All types of conflicts and stress should be minimal. Although undesirable incidents are to be avoided, certain limitations in the structure of acceptable behavior should not be sacrificed. Children find security when limitations are firm and consistent.

### Illustration of a Specific Activity

Today, teachers should introduce the special person to each child. This person should give his whole and undivided attention to one individual child at a time. The activity engaged in with the child is not important; it could include anything and may be nothing more than being side by side.

## Unit II

## Conceptual Responses

### Rationale

One of the prime components of motivation to achieve is the concept of the self as an achiever. The way the child sees himself in the learning situation appears to influence how well he will perform. If the child conceives of himself as an achiever, he appears to work until he does succeed in learning. If, on the other hand, he regards himself as a failure, he appears to stop trying and does indeed eventually fail.

The self-concept is a learned covert response, reached as a result of experiences and exposures. The school environment is new to the four-year-old child; the way he learns to see himself in this setting will greatly determine his motivation for learning throughout his academic career. In a sense, every moment may be crucial in the formation of the child's concept of himself in school. He is constantly searching his environment for a reflection of himself. Thus, the activities throughout the preschool day are of critical importance.

## Ongoing Activities

Teachers should treat each child as a unique human being: they should use each child's name, particularly in sentences that describe his achievements; individualize greetings and farewells; notice changes from day to day; show understanding and patience when a child spills or breaks something; differentiate between the child, as a person who is always acceptable, and his behavior, which may not always be; realize that when a child talks he believes he has something to say and needs full attention; and give explanations that the children are entitled to have so that they know what is going on.

Teachers should expect each child to behave differently: they should try to eliminate mass responses to questions; conduct quiet conversations with each child about things that concern him; allow each child to move at his own pace; respect his freedom to choose even when his choices differ from their own; reinforce individual accomplishments more than group accomplishments.

Teachers should honestly believe that each child is an achiever in learning: they should entertain no doubt that each child will be able to perform well; structure each task to a level so that each child can see himself achieving; help each child to attain realistic levels of aspiration; and at the same time, pace accomplishments so that they continually become a little more difficult.

Teachers should provide each child with opportunities to see himself as an achiever; allow each child frequently to take home with him some tangible evidence that he has achieved; and provide opportunities for children to talk about their accomplishments.

Illustration of a Specific Activity

Introduce the "I Can Do" box. Each child should be given a box with his name on it. Explain that there are cards that fit the box. Each card has a picture on it of something that can be done. Each child may have any card when he shows that he can do what the card depicts. The teachers hold up the cards and give all the children an opportunity to perform one of the activities successfully.

## Unit III

## Purposive Responses

### Rationale

The focus of this unit is to develop purposive responses, i.e., to learn in a school situation with conscious goal-directed behavior.

As a result of feeling safe and happy in his environment and knowing that he can achieve, the child is now ready to learn how to set up purposes towards which to work within the school setting. The concept of motivation itself implies a direction or goal for behavior. Motivation to achieve and to do well explicitly refers to behavior which has, as a component, the purpose or desire to achieve and to do well. Children who are so motivated at school do show their purposive behavior in their actions. Their behavior goes beyond merely holding to purposes set up for them either explicitly by the teacher or implicitly by the school situation, to the children's being able to come up with purposes independently of the structure. Their ability to form purposes from relatively unstructured situations is crucial if motivation is to exist.

## Ongoing Activities

Teachers should concern themselves primarily with fostering the establishing of goals by the child himself, rather than his accomplishing goals set for him by the teacher. The stress should be on creating purposes for performing rather than on the success in performance.

Teachers should continually model the process of forming purposes by consciously trying to verbalize this process in front of the children even for the smallest of activities undertaken.

As each teacher models purposive behavior, she should reinforce every effort a child may make to set up a goal regardless of the goal itself. Teachers should capitalize on opportunities to reinforce the formation of goals by each child when they occur during the day. Remember, it is the process of forming a goal that should be reinforced and not the actual goal selected.

Teachers should constantly ask each child to express his goal in each activity in which he engages. The child may not be able to verbalize his goal but should continually be encouraged to do so.

The teacher should begin each day by asking the children to help plan an activity for the day. The process of suggesting goals by each child should be reinforced, and the teacher should verbalize as much as possible the need for goals in the child's activities. As the goals are formed and the process reinforced, some of the goals should be written or pictured on the board and made reference to as the activity is accomplished during the day.

## Unit IV

## Cognitive Responses

### Rationale

If a child is to be motivated to do well in school, he must also know how he can do well in school, i.e., he must know the instrumental steps that will help him to obtain his goal. He must be able not only to differentiate between work and goals and to understand that work comes before the goal, but also to understand that the goal must be kept in mind before the work can be set in motion in an orderly way. Being able to differentiate behavior that will help him toward goals and behavior that will hinder him from obtaining them is also essential. Most important, however, is the child's realization that he is personally in control of whether or not he will eventually reach his goal.

### Ongoing Activities

In order to teach these cognitive responses, teachers must continually emphasize, both behaviorally and verbally, the following three ideas:

1. It is necessary to work to get what is wanted;
2. Some ways of working are effective in getting what is wanted, other ways are not; and
3. Each person is more likely to get what he wants if he will work for it.

## Unit V

## Ethical Responses

### Rationale

Inherent in the concept of motivation to achieve is the presence of a standard of performance that functions in the evaluation and direction of behavior. Those individuals who appear to be motivated to achieve know how to evaluate their own performance and seem to be impelled to try to remove any discrepancy between their performance and their concept of how good their performance should be.

Ongoing Activities

Teachers should model and verbalize the evaluation process. They should continually try to get their children to consider their work critically. The approach must be positive in reinforcing the child for what he has accomplished and must also be effective in pointing out how the particular performance could be improved. Once this process is internalized, the child will become his own effective self-reinforcer and self-detractor with respect to behavior essential to motivation to achieve.

The final section of the curriculum was aimed at integrating the components of achievement-motivated behavior. The most successful activities tried in earlier sections were used, coordinating all the response constituents that were selectively reinforced previously. It must be understood that motivation to achieve has been separated into types of responses for the purposes of emphasis within the curriculum and that in reality they occur many times simultaneously and interact with each other.

## Evaluation of the Curriculum

This curriculum to teach motivation to achieve to preschoolers was applied in an exploratory way to three Head Start classrooms in Hawaii. The ideas were tried out and then either accepted or, in most instances, modified or discarded. Evaluation was continuous and was specifically sought in monthly sessions between teachers and researchers who had spent many hours in the classrooms. This ongoing evaluation was immediately incorporated into the design of the materials, which were then given another trial.

In general, the teachers were highly favorable in their overall evaluation of the curriculum. They were not always certain of the implications of the ongoing activities but found the specific activities of great value. Their primary problem was to put into actual use the human stimuli and human reinforcement concepts. This difficulty experienced by the teachers in putting into operation in the classroom the ongoing activities related to motivation was a source of concern among the research staff. It was their impression that while the teachers did improve in so doing, the training provided was not sufficient to develop competence in this area, on which the success of the motivation curriculum depends. Future endeavors might well include a number of sessions in which staff and teachers expose themselves to a class of real children with a master teacher and engage in observation, directed discussions, practice teaching, and critical evaluation.

Inasmuch as the outcomes of this curriculum are so contingent upon the ongoing interaction between teacher and child, it seemed imperative that some additional evaluation of the teachers in the classroom be made. For this reason, the research staff made periodic observations of every classroom. Analysis of these observations seemed to provide evidence that in this study, as in numerous others, the results were confounded by the teacher's personality, thus further verifying suspicions that the teacher-training techniques were not sufficiently effective to optimally modify the extent to which the ongoing activities took place.

Attempts to quantitatively scale teacher performance were also made. A scale that was developed by the staff appears to have potential but lacks empirical justification; no validity or reliability studies have as yet been made on it. Although the scale was used in rating these teachers, the lack of knowledge concerning its effectiveness makes the results questionable. Nevertheless, there was a general decrease in the ratings assigned to teachers over the entire year. Part of this decline might be attributable to the increased sophistication of the observers; i.e., as the research staff continued in the project, they became more and more aware of the subtle influences operating in the teacher-child interaction. Inasmuch as the written descriptions of the teacher's performances by the same staff seem to indicate that there was indeed progress in the ability of the teachers to perform in the specified manner, to interpret the findings of the scale at their face value would lead to an obvious contradiction. With the data at hand, it is almost impossible to evaluate the relative effectiveness of the different teachers in presenting the curriculum. Such evaluation is essential in further studies of this type of curriculum. Better ways of solving this problem are needed.

Pre-test and post-test data were gathered for three experimental and three comparison classes. Pre-tests given in late September consisted of Gumpgookies and the Stanford-Binet. The form of the Gumpgookies used in the pre-testing was the 100-item, left-right form that was later modified in an attempt to reduce the effect of extraneous influences, primarily answer position and primacy versus recency.

The post-testing began in early April. By this time, however, the revised 75-item, randomized form of Gumpgookies had been completed, and it was also administered to three of the six classes.

An analysis of variance of the pre- and post-test Stanford-Binet scores showed a significant gain for both experimental and comparison groups. Although the experimental group was higher in both pre- and post-test ($p < .11$), the rates of gain were not significantly different for the two groups, as the data presented in Table 7.1 indicate.

An analysis of variance of the 100-item Gumpgookies scores for pre- and post-tests for both groups (Table 7.2) again showed a significant gain for both experimental and comparison groups. Although there were no significant differences at pre-test time between experimental and comparison groups, the rate of gain was greater for the experimental group as compared with the comparison subjects ($p < .11$).

An analysis of variance of the scores obtained with the improved 75-item, randomized form of the Gumpgookies administered as a post-test to three classes (Table 7.3) indicates a significant difference in favor of the experimental classes as compared with the comparison group ($p < .05$). However, the significance of these differences disappears when the pre-test 100-item Gumpgookies scores are used in a covariance analysis, although the post-test means are still in favor of the experimental groups (Table 7.4).

## TABLE 7.1

### Analysis of Variance of *Stanford-Binet* Pre- and Post-Test Scores for Three Motivation Classes Combined (N = 59) and Three Comparison Classes Combined (N = 41)

| Groups | Means | |
|---|---|---|
| | Pre-Test | Post-Test |
| Motivation | 87.95 | 93.19 |
| Comparison | 83.54 | 90.12 |

Sources of Variance

| Source | Mean Squares | D.F. | *F* Ratio | p |
|---|---|---|---|---|
| Total | 175.72 | 199 | | |
| Between Groups | 275.26 | 99 | | |
| Groups | 677.00 | 1 | 2.50 | < .11 |
| Error (Groups) | 271.16 | 98 | | |
| Within Groups | 77.17 | 100 | | |
| Trials | 1677.00 | 1 | 27.30 | < .001 |
| Groups by Trials | 20.00 | 1 | .33 | < .58 |
| Error (Trials) | 61.42 | 98 | | |

## TABLE 7.2

Analysis of Variance of 100-Item *Gumpgookies*
Pre- and Post-Test Scores for Three Motivation Classes
Combined (N = 59) and Three Comparison Classes Combined (N = 41)

| Groups | Means | |
|---|---|---|
| | Pre-Test | Post-Test |
| Motivation | 57.00 | 64.17 |
| Comparison | 56.78 | 60.95 |

Sources of Variance

| Source | Mean Squares | D.F. | *F* Ratio | p |
|---|---|---|---|---|
| Total | 83.36 | 199 | | |
| Between Groups | 106.55 | 99 | | |
| Groups | 142.69 | 1 | 1.34 | < .25 |
| Error (Groups) | 106.18 | 98 | | |
| Within Groups | 60.41 | 100 | | |
| Trials | 1764. 00 | 1 | 41.45 | < .001 |
| Groups by Trials | 109.13 | 1 | 2.57 | < .11 |
| Error (Trials) | 42.53 | 98 | | |

## TABLE 7.3

### Analysis of Variance of 75-Item, Randomized Form of Gumpgookies for Three Classes

| | Mean | N |
|---|---|---|
| Motivation 1 | 55.84 | 19 |
| Motivation 2 | 53.40 | 15 |
| Comparison | 48.36 | 11 |

Sources of Variance

| Source | Mean Squares | D.F. | F Ratio | P |
|---|---|---|---|---|
| Total | 66.35 | 44 | | |
| Groups | 195.25 | 2 | 3.24 | < .05 |
| Error | 60.21 | 42 | | |

### TABLE 7.4

### Analysis of Covariance of Scores for the 75-Item, Randomized Form of Gumpgookies With the Pre-Test 100-Item, Left-Right Form of Gumpgookies as Covariate for Three Classes

| Group | Mean | Adjusted Mean | Adjusted S.E. | N |
|---|---|---|---|---|
| Motivation 1 | 55.84 | 54.69 | 1.79 | 19 |
| Motivation 2 | 53.40 | 53.49 | 1.93 | 15 |
| Comparison | 48.36 | 50.22 | 2.41 | 11 |

# CHAPTER 8

# SUMMARY AND PROPOSED FUTURE RESEARCH

This report has presented results to date of research over a five-year period, first, on measurement of motivation of young children to achieve in school. After consideration and tryout of numerous ideas and techniques, efforts were concentrated on development of the measuring instrument called Gumpgookies. Each item in this test consists of two imaginary figures called gumpgookies that the examiner describes. The child chooses the one with which he identifies. Three forms of the test have resulted from the preliminary analyses: (a) a 75-item form to be individually administered to preschool children, (b) one 100-item group form for non-reading elementary school children, and (c) a second 100-item group form for elementary school children who can read.

The test had its roots in a theoretical framework, which conceives of five constituents of motivation to achieve: (a) an affective component, expressed as positive affect from achievement; (b) a conceptual component, whereby the individual sees himself as an achiever; (c) a purposive component, enabling the individual to establish and respond to future goals; (d) a cognitive component, by means of which the instrumental steps necessary to attain goals are known; and (e) an ethical component, through which the individual can evaluate his own performance.

With the first format used for the test, techniques of factor analysis and a type of cluster analysis were applied in order to judge the adequacy of the underlying theory. It was soon discovered that the factors were partially determined by one or both of two extraneous influences: the position of the correct alternative on the item page--right or left--and the order in which the two alternatives were presented to the child. With the original format, the effects of these two influences could not be separated, because the alternatives were read by the examiner from a left-hand position to a right-hand position. An additional extraneous influence affecting some factors seemed to be the position of an item in the test--toward the beginning or toward the end. The body of the report describes the various methods used in an attempt to shed light on these non-substantive influences.

The format was revised so that the illustrations appeared in various positions on the item pages, and the order in which the illustrations are described was randomized. At the same time, many of the items for the individual form for use with younger children were revised to reduce the cognitive and verbal difficulty.

The individual form was administered to 10 ethnic-cultural groups of preschool children, 1,607 in all, that were geographically scattered over the United States. The appropriate group form was administered to children in the first, second, and fourth grades in Hawaii, a total of 668.

Separate factor analyses (always to a six-factor solution and occasionally to solutions with other numbers of factors) were performed for each of the 10 ethnic-cultural groups and for each of the three grade groups, as well as for the 10 ethnic-cultural groups combined, grades 1 and 2 combined, and grades 1, 2, and 4 combined. The correlation coefficients among the loadings of the 60 factors for the 10 groups of preschool children were themselves factored. Likewise, the correlation coefficients for the 18 factors for grades 1, 2, and 4 were factored. By reference to the original factor solutions, items were assigned in each case to one of six factors that have been referred to as initial super-factors. This technique involved a degree of subjectivity in assignment of items, and later efforts were addressed to the improved super-factors that resulted from factorizations of data for the large, combined groups.

The two improved super-factor solutions, which were not expected to be identical, could be compared because the 75 items in the form for younger children had been selected from the 100 used for the older groups. Some items, however, had been revised in wording, and the answer positions and order of presentation of alternatives were not necessarily the same.

For some of the super-factors, as well as for some factors based on the several subgroups, there is again evidence of the consequences of the three types of extraneous influences mentioned above, which seem to be "characteristics of the organism." The effects of answer position seem to be more prominent for the younger children, while the influence of primacy versus recency appears to be more in evidence for the older children. The position of items in the test also apparently affects certain factors for the younger children to a greater degree than for the older.

Despite these troublesome non-substantive influences that add to the difficulty of interpreting separate factors, the total score, when considered for a group of subjects, should not be systematically affected by them unless all of the subjects have the same answer-position, item-position, and primacy versus recency tendencies. Inspection of answer sheets reveals no such similarities. However, there seems to be no escape from the fact that total scores for individual children may be distorted by their idiosyncratic proclivities to be affected by irrelevant tendencies.

The super-factors based on the two analyses for the combined groups of subjects were interpreted. Some factors were more strongly identified than others, perhaps at least in part because production of items tapping certain components is relatively easy. For the elementary school children, interpretations for five factors that are consonant with the theoretical constituents were offered. A sixth, rather weak factor, not provided for in the theory, was very gingerly identified as self-reliance or dependability. Tentative interpretations for five of the six factors based on the combined preschool groups were made, and the relations with the six factors based on the older children were explored. If, as much evidence indicates, motivation represents learned behavior, factors will almost certainly differ for different age groups.

Other evidence relevant to the reliability and validity of the total score on Gumpgookies is collected in Chapter 5 of the report. It has long been clear that internal consistency estimates, based on KR-20, are quite satisfactory, running in the low to mid .80's for the 75-item form and in the upper .80's or low .90's for the 100-item form. Evidence for test-retest reliability or comparable forms reliability is not yet available, although it was found that scores on a 100-item, non-randomized form correlated .66 with scores on a 75-item, randomized, and revised form given two or three weeks later (N = 44). For the age ranges concerned, the correlation of Gumpgookies with age was low and positive, and its relation with IQ was of the order of .20 to .35. For one sample of 135 four-year-olds, its correlation with the Preschool Inventory was

.31, higher than the correlation of .24 with the Binet for that sample.* For a group of second-grade children, its correlation with the Children's Self-Concept Index, a test used in the Westinghouse Learning Corporation follow-up study of Head Start children based on one by Joseph H. Meyerowitz, was .43. This can be regarded as a relatively high correlation because the range of scores on the latter test was very small and because its content appears to deal principally with the Gumpgookies factor interpreted as self-confidence.

Chapter 5 also reports positive relations of Gumpgookies with teachers' rankings or ratings of motivation based upon several procedures and indicates that the test does discriminate between children rated as high and those rated as low in motivation.

Based upon the conviction that motivated behavior is learned, concurrent with the development and refinement of a measuring instrument were exploratory attempts to teach motivation in preschool classes, a second major focus of the studies reported herein. A motivation curriculum was developed and tried out with three Head Start classes, their scores on several pre- and post-tests being compared with those for three classes not exposed to the curriculum. The findings were considered of sufficient promise to warrant further efforts to teach motivation with a revised curriculum during the school year 1969-70.

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*For that sample, in a factor analysis done after Chapter 6 was written, Gumpgookies had its highest loading on a factor also most heavily loaded for percentage of work responses on the Binet, motivation rankings, the Preschool Inventory, and the Animal-House subtest of the WPPSI. Perhaps this is a motivated work factor.

## Avenues of Further Research

Further studies of Gumpgookies based upon data already available. Although a large amount of data on Gumpgookies has been collected and much of it has been analyzed, more intensive study of the data is planned. This work will be geared to the following problems:

1. Interpretation of the factors for each of the 13 subgroups and more detailed comparisons among these factors and of these factors with super-factors. Although many such comparisons have been made by systematic inspectional techniques as computer outputs became available, more rigorous comparisons by means of correlating each set of loadings with every other set will be more definitive.
2. Determination of the mean item difficulty level and the dispersion of item difficulty indices for each factor for each group.
3. Separate factor analyses for the two sexes for each of the subgroups.
4. Research on the relative importance of extraneous influences on the factors for the various subgroups.
5. Study of the individual items--their difficulty, item-test correlation, and factorial composition for each group--followed by item revision or rejection, if indicated.
6. Investigation of changes in item difficulty and item-test correlation with age, based upon different groups of children of different ages.

7. Study of changes in item difficulty and item-test correlation for the same sample of children who have been in a Head Start program from pre-test to post-test, over an interval of five to six months.

8. Estimation of the internal consistency of scores on super-factors.

9. Comparison of scores on the two sets of improved super-factors for the relevant subgroups.

10. A series of similar item analyses and factor analyses for the data on the first 100-item form used as a pre-test and a selected 55 items used as a post-test in the 1968-69 national evaluation study of Head Start. The total number of subjects for the 12 Evaluation and Research Centers was 1,742 for the pre-test and 1,624 for the post-test. Such studies, based upon subjects of different ethnic characteristics, from different parts of the United States, and differing with respect to urban versus rural environments, will also add valuable results for comparison with findings for the other groups already studied.

Further studies of Gumpgookies requiring additional data. Some of the problems that should be investigated will require additional data. These problems include the following:

1. A more dependable estimate of test-retest reliability than is now available will be made, based upon an interval of perhaps two to four weeks.

2. Eventually, if two comparable forms of the test can be developed, an estimate of comparable forms reliability will be obtained, along with such estimates for each major factor.

3. Further work on the relation of the test with external criteria will be done. Several of the criterion measures that have been tried in a limited way are promising. They, as well as new measures, warrant systematic study in relation to the test.
4. In addition to teacher ratings of general motivation, ratings for each of several factors may be useful as criteria for the respective factors. Such ratings have not yet been tried and teachers may be resistive, but the approach will be considered.
5. Criterion measures based upon records and/or products of actual behavior will be intensively explored. Such measures might be based upon performance in situational tests designed to present opportunities for motivated behavior to manifest itself with respect to one or more or even the totality of the factors. Once reliable criteria are available, further validation studies will be feasible.
6. The current forms of the test will be revised in the light of all data collected, and the reliability and validity of the revised forms will be investigated.
7. Since production of items tapping some factors has been easier than for others, more new items will be constructed for some of the less clearly identified factors so that eventually there can be scores for factors, not just total scores, that are reasonably reliable.
8. More nearly comparable samples of subjects in different ethnic, cultural, and socioeconomic groups will be needed before fully defensible comparisons among groups can be made.

9. In relation to the development of motivation, possible interactions among ethnicity, socioeconomic level, rural versus urban background, sex, and possibly age and other variables warrant study.

10. Once significant differences among subgroups are identified, the etiology of such differences--as, e.g., with respect to child-rearing practices; parental attitudes, aspirations, and expectations with respect to the child; the parents' own motivation to achieve; teacher attitudes; preschool and elementary school curricula; and a host of other factors--will be studied.

11. Methodological solutions are at hand that will further the clarification of substantive motivational factors, free of the extraneous effects of the vexatious set factors that have hampered interpretations of motivational factors. One such solution, for a test of the length regarded as essential to tap several factors, is suggested by the work of Sheila C. Feld and Judith Lewis (1969) on the Test Anxiety Scale for Children (Sarason, et al., 1960). They developed special forms of the test, each including some items in reversed form as well as in the original form, in an effort to separate the effects of an acquiescence factor from the content factors in the test. They then argued, quite soundly, that a factor on which the reversed item tended to have loadings about equal but of opposite sign to that of the original item was a genuine content factor. With the Gumpgookies test, however--and especially in view of the number of factors that are hypothesized and that hence require a relatively large number of items--another approach

is preferred. It will not require giving the same items to the same group of children in one of several possible reversed forms. Rather, it will necessitate that different forms of the test be given to different groups of subjects. All forms of the test will contain identical items insofar as content is concerned; but answer positions, item positions in the test, and order of presentation of alternatives for each item will be systematically varied. The number of different forms will be dependent in large part upon financial and personnel resources available for the study. In any case, all results, item by item, will be combined, and perhaps factor analyses based on subsamples representing different populations can be made as well. The results, it is expected, will confirm that there are substantive motivational factors, independent of extraneous set factors.

12. Following the foregoing research that will serve to separate the influence of motivational content factors from extraneous set factors, more work will be done to develop criteria for establishing the extent to which set factors may be distorting or invalidating scores of individual children.

Further efforts toward curriculum development for preschool children. Accompanying work aimed at improving the measuring instrument with respect to reliability and validity and at understanding the basic constituents of motivation will be more intensified efforts in the direction of teaching motivation. The work that has been reported is correctly to be regarded as in a very early stage. Much more needs to be known about

1. the extent to which effects of training in motivation are retained, as might be investigated by means of follow-up

studies on groups such as those in the 1968-69 experimental classes and later ones.

2. kinds of activities conducive to development of particular factors of motivation--and for what kinds of children at what ages.
3. ways of introducing the activities and related materials in a class setting, taking into account optimal sequencing.
4. characteristics of teachers that are associated with their abilities to inculcate motivation in the children they teach.
5. techniques and materials to be used to train teachers in improved abilities to teach the various facets of motivation.
6. methods and materials for training parents to reinforce efforts of teachers to induce the pervasive habits and attitudes subsumed under the term motivation.

Eventual extension of techniques for teaching motivation to pre-preschoolers and post-preschoolers. Children do not suddenly begin to be motivated when they reach preschool age, nor should they cease learning to be motivated when they leave preschool. Undoubtedly certain types of environments and experiences tend to foster one or more components of motivation at very young ages. If such factors can be identified, they almost certainly will not be interpretable as identical with those for preschool children or for elementary school children. But perhaps even for children as young as two or three years of age broader or more general factors can be conceptualized, though their accurate measurement may not be possible, and serve as a springboard for attempting to stimulate and reinforce motivated behavior. Such factors, just by way of illustration, might be energetic behavior; self-confidence, which, to be sure, shows up for the older two levels; responsiveness to immediate goals, in contrast to more remote goals; responsiveness to the influence of adults or to that of other persons; attentiveness to things in the environment; curiosity; and so on.

If a group of experts in the learning of children of from two to three years of age could agree upon potentially fruitful focuses of training efforts, it should be possible to devise curricular materials and teaching procedures that would enhance behavior in the predicated directions. Clearly such efforts would have to intimately involve parents or whatever persons are responsible for care of the young child.

At the other end of the age spectrum beyond preschool, efforts to teach motivation should be sustained. Indeed, if the ages six to nine are especially critical in the evaluation of motivation to achieve (Veroff, 1969), then this age period may be optimal for efforts to teach motivation. Some of the general ideas and methods here developed for preschool children may continue to be effective for older children, but additional innovative efforts will be needed.

# Appendix

## "Norms" for the 55-Item *Gumpgookies*, Based Upon Pre-test Scores of 1485 Children in the 1968-69 Head Start National Evaluation Sample

University of Hawaii
Head Start Research Center

The nature of these "norms" and the procedure by which they were developed calls for some explanation. First, scores on the *Gumpgookies* pre-test, which contained 100 items, were recomputed for the 55 items that comprised the post-test. The subjects were then segregated into age groups, with a one-month interval. Data from all Head Start Evaluation and Research Centers were supplied to the Hawaii Center by Dr. Lois-ellin Datta. The means and standard deviations for these age groups are shown in an accompanying table:

### Means and Standard Deviations on the 55 *Gumpgookies* Pre-test Items that Comprised the Post-test, by One-Month Age Intervals

| Age | Mean | Standard Deviation | N | Age | Mean | Standard Deviation | N |
|---|---|---|---|---|---|---|---|
| 69 | 41.1 | 7.4 | 27 | 56 | 35.8 | 9.3 | 99 |
| 68 | 41.4 | 7.5 | 23 | 55 | 36.4 | 8.1 | 78 |
| 67 | 41.5 | 8.4 | 35 | 54 | 37.3 | 8.4 | 80 |
| 66 | 40.1 | 6.8 | 39 | 53 | 36.7 | 9.1 | 71 |
| 65 | 39.9 | 8.0 | 31 | 52 | 36.2 | 8.1 | 109 |
| 64 | 42.3 | 7.6 | 36 | 51 | 33.9 | 8.6 | 96 |
| 63 | 39.7 | 7.6 | 49 | 50 | 33.9 | 8.1 | 80 |
| 62 | 41.6 | 8.1 | 54 | 49 | 37.5 | 8.8 | 102 |
| 61 | 38.4 | 6.9 | 39 | 48 | 33.2 | 9.9 | 74 |
| 60 | 39.8 | 9.0 | 32 | 47 | 35.05 | 6.3 | 58 |
| 59 | 38.0 | 7.0 | 56 | 46 | 33.6 | 8.0 | 45 |
| 58 | 36.2 | 9.3 | 61 | 45 | 34.1 | 7.2 | 18 |
| 57 | 37.3 | 8.1 | 72 | 44 | 34.2 | 6.7 | 21 |

It will be noted that, although there is a trend for the scores to increase with age, the curve of mean score against age fluctuates. For example, the mean for children 49 months of age exceeds those for children 50 and 51 months of age; and the mean for the 62-month age group exceeds the means for ages 65 through 69 months. This finding, although not unanticipated, indicates that it would not make sense to try to develop "national" norms, such as transmuted standard scores, using for each monthly age group its mean and standard deivation. The reason is simply that a particular score for one age group might have a lower transmuted score than would the same score for a higher age group. Nor would the irregularity disappear entirely if a larger age interval, say two, three, or four months, were to be used, and a still larger interval would defeat the purpose of the norms.

The procedure adopted was to "fit" a straight line to the means for successive age groups, to extrapolate it downward to age 43 months and upward to 79 months, then to read from the graph the mean corresponding to each monthly age interval. The standard deviations are not constant but reveal no particular trend with increasing age. The unweighted average is 7.7. To simplify the arithmetic, the following formula was applied:

$$Z = \frac{15\,(X - \bar{X})}{7.5} + 100,$$

where Z is the transmuted score and X the raw score. This formula will result in scores with a predicted mean of 100 and a standard deviation of roughly 15. When the formula was applied, rounding resulted in the same Z-scores for particular adjacent age groups. Hence the ages in questions were combined in the resulting table of norms.

It is recognized that the data are not ideal mainly because the different age groups from different parts of the country do not represent large samples drawn at random from a nation-wide pool of Head Start children. Nevertheless, it is hoped that they will be serviceable in interpreting change from pre-test to post-test, as against trying to interpret raw-score changes without an age base. Each Center is of course free to make whatever use of the table of norms it desires, or no use.

## Z-Score "Norms" for the 55-Item *Gumpgookies*, Based Upon Pre-test Scores of 1485 Children in the 1968-69 Head Start National Evaluation Sample (See Text)

Age in Months

| Raw Score | 43 | 44-45 | 46 | 47 | 48-49 | 50 | 51-52 | 53 | 54-55 | 56 | 57 | 58-59 | 60 | 61 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 55 | 144 | 143 | 142 | 141 | 140 | 139 | 138 | 137 | 136 | 135 | 134 | 133 | 132 | 131 |
| 54 | 142 | 141 | 140 | 139 | 138 | 137 | 136 | 135 | 134 | 133 | 132 | 131 | 130 | 129 |
| 53 | 140 | 139 | 138 | 137 | 136 | 135 | 134 | 133 | 132 | 131 | 130 | 129 | 128 | 127 |
| 52 | 138 | 137 | 136 | 135 | 134 | 133 | 132 | 131 | 130 | 129 | 128 | 127 | 126 | 125 |
| 51 | 136 | 135 | 134 | 133 | 132 | 131 | 130 | 129 | 128 | 127 | 126 | 125 | 124 | 123 |
| 50 | 134 | 133 | 132 | 131 | 130 | 129 | 128 | 127 | 126 | 125 | 124 | 123 | 122 | 121 |
| 49 | 132 | 131 | 130 | 129 | 128 | 127 | 126 | 125 | 124 | 123 | 122 | 121 | 120 | 119 |
| 48 | 130 | 129 | 128 | 127 | 126 | 125 | 124 | 123 | 122 | 121 | 120 | 119 | 118 | 117 |
| 47 | 128 | 127 | 126 | 125 | 124 | 123 | 122 | 121 | 120 | 119 | 118 | 117 | 116 | 115 |
| 46 | 126 | 125 | 124 | 123 | 122 | 121 | 120 | 119 | 118 | 117 | 116 | 115 | 114 | 113 |
| 45 | 124 | 123 | 122 | 121 | 120 | 119 | 118 | 117 | 116 | 115 | 114 | 113 | 112 | 111 |
| 44 | 122 | 121 | 120 | 119 | 118 | 117 | 116 | 115 | 114 | 113 | 112 | 111 | 110 | 109 |
| 43 | 120 | 119 | 118 | 117 | 116 | 115 | 114 | 113 | 112 | 111 | 110 | 109 | 108 | 107 |
| 42 | 118 | 117 | 116 | 115 | 114 | 113 | 112 | 111 | 110 | 109 | 108 | 107 | 106 | 105 |
| 41 | 116 | 115 | 114 | 113 | 112 | 111 | 110 | 109 | 108 | 107 | 106 | 105 | 104 | 103 |
| 40 | 114 | 113 | 112 | 111 | 110 | 109 | 108 | 107 | 106 | 105 | 104 | 103 | 102 | 101 |
| 39 | 112 | 111 | 110 | 109 | 108 | 107 | 106 | 105 | 104 | 103 | 102 | 101 | 100 | 99 |
| 38 | 110 | 109 | 108 | 107 | 106 | 105 | 104 | 103 | 102 | 101 | 100 | 99 | 98 | 97 |
| 37 | 108 | 107 | 106 | 105 | 104 | 103 | 102 | 101 | 100 | 99 | 98 | 97 | 96 | 95 |
| 36 | 106 | 105 | 104 | 103 | 102 | 101 | 100 | 99 | 98 | 97 | 96 | 95 | 94 | 93 |
| 35 | 104 | 103 | 102 | 101 | 100 | 99 | 98 | 97 | 96 | 95 | 94 | 93 | 92 | 91 |
| 34 | 102 | 101 | 100 | 99 | 98 | 97 | 96 | 95 | 94 | 93 | 92 | 91 | 90 | 89 |
| 33 | 100 | 99 | 98 | 97 | 96 | 95 | 94 | 93 | 92 | 91 | 90 | 89 | 88 | 87 |
| 32 | 98 | 97 | 96 | 95 | 94 | 93 | 92 | 91 | 90 | 89 | 88 | 87 | 86 | 85 |
| 31 | 96 | 95 | 94 | 93 | 92 | 91 | 90 | 89 | 88 | 87 | 86 | 85 | 84 | 83 |
| 30 | 94 | 93 | 92 | 91 | 90 | 89 | 88 | 87 | 86 | 85 | 84 | 83 | 82 | 81 |
| 29 | 92 | 91 | 90 | 89 | 88 | 87 | 86 | 85 | 84 | 83 | 82 | 81 | 80 | 79 |
| 28 | 90 | 89 | 88 | 87 | 86 | 85 | 84 | 83 | 82 | 81 | 80 | 79 | 78 | 77 |
| 27 | 88 | 87 | 86 | 85 | 84 | 83 | 82 | 81 | 80 | 79 | 78 | 77 | 76 | 75 |
| 26 | 86 | 85 | 84 | 83 | 82 | 81 | 80 | 79 | 78 | 77 | 76 | 75 | 74 | 73 |
| 25 | 84 | 83 | 82 | 81 | 80 | 79 | 78 | 77 | 76 | 75 | 74 | 73 | 72 | 71 |
| 24 | 82 | 81 | 80 | 79 | 78 | 77 | 76 | 75 | 74 | 73 | 72 | 71 | 70 | 69 |
| 23 | 80 | 79 | 78 | 77 | 76 | 75 | 74 | 73 | 72 | 71 | 70 | 69 | 68 | 67 |
| 22 | 78 | 77 | 76 | 75 | 74 | 73 | 72 | 71 | 70 | 69 | 68 | 67 | 66 | 65 |
| 21 | 76 | 75 | 74 | 73 | 72 | 71 | 70 | 69 | 68 | 67 | 66 | 65 | 64 | 63 |
| 20 | 74 | 73 | 72 | 71 | 70 | 69 | 68 | 67 | 66 | 65 | 64 | 63 | 62 | 61 |
| 19 | 72 | 71 | 70 | 69 | 68 | 67 | 66 | 65 | 64 | 63 | 62 | 61 | 60 | 59 |
| 18 | 70 | 69 | 68 | 67 | 66 | 65 | 64 | 63 | 62 | 61 | 60 | 59 | 58 | 57 |
| 17 | 68 | 67 | 66 | 65 | 64 | 63 | 62 | 61 | 60 | 59 | 58 | 57 | 56 | 55 |
| 16 | 66 | 65 | 64 | 63 | 62 | 61 | 60 | 59 | 58 | 57 | 56 | 55 | 54 | 53 |
| 15 | 64 | 63 | 62 | 61 | 60 | 59 | 58 | 57 | 56 | 55 | 54 | 53 | 52 | 51 |
| 14 | 62 | 61 | 60 | 59 | 58 | 57 | 56 | 55 | 54 | 53 | 52 | 51 | 50 | 49 |
| 13 | 60 | 59 | 58 | 57 | 56 | 55 | 54 | 53 | 52 | 51 | 50 | 49 | 48 | 47 |
| 12 | 58 | 57 | 56 | 55 | 54 | 53 | 52 | 51 | 50 | 49 | 48 | 47 | 46 | 45 |
| 11 | 56 | 55 | 54 | 53 | 52 | 51 | 50 | 49 | 48 | 47 | 46 | 45 | 44 | 43 |
| 10 | 54 | 53 | 52 | 51 | 50 | 49 | 48 | 47 | 46 | 45 | 44 | 43 | 42 | 41 |

## Z-Score "Norms" for 55-Item Gumpgookies, Continued

Age in Months

| Raw Score | 62-63 | 64 | 65-66 | 67 | 68 | 69-70 | 71 | 72 | 73-74 | 75 | 76-77 | 78 | 79 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 55 | 130 | 129 | 128 | 127 | 126 | 125 | 124 | 123 | 122 | 121 | 120 | 119 | 118 |
| 54 | 128 | 127 | 126 | 125 | 124 | 123 | 122 | 121 | 120 | 119 | 118 | 117 | 116 |
| 53 | 126 | 125 | 124 | 123 | 122 | 121 | 120 | 119 | 118 | 117 | 116 | 115 | 114 |
| 52 | 124 | 123 | 122 | 121 | 120 | 119 | 118 | 117 | 116 | 115 | 114 | 113 | 112 |
| 51 | 122 | 121 | 120 | 119 | 118 | 117 | 116 | 115 | 114 | 113 | 112 | 111 | 110 |
| 50 | 120 | 119 | 118 | 117 | 116 | 115 | 114 | 113 | 112 | 111 | 110 | 109 | 108 |
| 49 | 118 | 117 | 116 | 115 | 114 | 113 | 112 | 111 | 110 | 109 | 108 | 107 | 106 |
| 48 | 116 | 115 | 114 | 113 | 112 | 111 | 110 | 109 | 108 | 107 | 106 | 105 | 104 |
| 47 | 114 | 113 | 112 | 111 | 110 | 109 | 108 | 107 | 106 | 105 | 104 | 103 | 102 |
| 46 | 112 | 111 | 110 | 109 | 108 | 107 | 106 | 105 | 104 | 103 | 102 | 101 | 100 |
| 45 | 110 | 109 | 108 | 107 | 106 | 105 | 104 | 103 | 102 | 101 | 100 | 99 | 98 |
| 44 | 108 | 107 | 106 | 105 | 104 | 103 | 102 | 101 | 100 | 99 | 98 | 97 | 96 |
| 43 | 106 | 105 | 104 | 103 | 102 | 101 | 100 | 99 | 98 | 97 | 96 | 95 | 94 |
| 42 | 104 | 103 | 102 | 101 | 100 | 99 | 98 | 97 | 96 | 95 | 94 | 93 | 92 |
| 41 | 102 | 101 | 100 | 99 | 98 | 97 | 96 | 95 | 94 | 93 | 92 | 91 | 90 |
| 40 | 100 | 99 | 98 | 97 | 96 | 95 | 94 | 93 | 92 | 91 | 90 | 89 | 88 |
| 39 | 98 | 97 | 96 | 95 | 94 | 93 | 92 | 91 | 90 | 89 | 88 | 87 | 86 |
| 38 | 96 | 95 | 94 | 93 | 92 | 91 | 90 | 89 | 88 | 87 | 86 | 85 | 84 |
| 37 | 94 | 93 | 92 | 91 | 90 | 89 | 88 | 87 | 86 | 85 | 84 | 83 | 82 |
| 36 | 92 | 91 | 90 | 89 | 88 | 87 | 86 | 85 | 84 | 83 | 82 | 81 | 80 |
| 35 | 90 | 89 | 88 | 87 | 86 | 85 | 84 | 83 | 82 | 81 | 80 | 79 | 78 |
| 34 | 88 | 87 | 86 | 85 | 84 | 83 | 82 | 81 | 80 | 79 | 78 | 77 | 76 |
| 33 | 86 | 85 | 84 | 83 | 82 | 81 | 80 | 79 | 78 | 77 | 76 | 75 | 74 |
| 32 | 84 | 83 | 82 | 81 | 80 | 79 | 78 | 77 | 76 | 75 | 74 | 73 | 72 |
| 31 | 82 | 81 | 80 | 79 | 78 | 77 | 76 | 75 | 74 | 73 | 72 | 71 | 70 |
| 30 | 80 | 79 | 78 | 77 | 76 | 75 | 74 | 73 | 72 | 71 | 70 | 69 | 68 |
| 29 | 78 | 77 | 76 | 75 | 74 | 73 | 72 | 71 | 70 | 69 | 68 | 67 | 66 |
| 28 | 76 | 75 | 74 | 73 | 72 | 71 | 70 | 69 | 68 | 67 | 66 | 65 | 64 |
| 27 | 74 | 73 | 72 | 71 | 70 | 69 | 68 | 67 | 66 | 65 | 64 | 63 | 62 |
| 26 | 72 | 71 | 70 | 69 | 68 | 67 | 66 | 65 | 64 | 63 | 62 | 61 | 60 |
| 25 | 70 | 69 | 68 | 67 | 66 | 65 | 64 | 63 | 62 | 61 | 60 | 59 | 58 |
| 24 | 68 | 67 | 66 | 65 | 64 | 63 | 62 | 61 | 60 | 59 | 58 | 57 | 56 |
| 23 | 66 | 65 | 64 | 63 | 62 | 61 | 60 | 59 | 58 | 57 | 56 | 55 | 54 |
| 22 | 64 | 63 | 62 | 61 | 60 | 59 | 58 | 57 | 56 | 55 | 54 | 53 | 52 |
| 21 | 62 | 61 | 60 | 59 | 58 | 57 | 56 | 55 | 54 | 53 | 52 | 51 | 50 |
| 20 | 60 | 59 | 58 | 57 | 56 | 55 | 54 | 53 | 52 | 51 | 50 | 49 | 48 |
| 19 | 58 | 57 | 56 | 55 | 54 | 53 | 52 | 51 | 50 | 49 | 48 | 47 | 46 |
| 18 | 56 | 55 | 54 | 53 | 52 | 51 | 50 | 49 | 48 | 47 | 46 | 45 | 44 |
| 17 | 54 | 53 | 52 | 51 | 50 | 49 | 48 | 47 | 46 | 45 | 44 | 43 | 42 |
| 16 | 52 | 51 | 50 | 49 | 48 | 47 | 46 | 45 | 44 | 43 | 42 | 41 | 40 |
| 15 | 50 | 49 | 48 | 47 | 46 | 45 | 44 | 43 | 42 | 41 | 40 | 39 | 38 |
| 14 | 48 | 47 | 46 | 45 | 44 | 43 | 42 | 41 | 40 | 39 | 38 | 37 | 36 |
| 13 | 46 | 45 | 44 | 43 | 42 | 41 | 40 | 39 | 38 | 37 | 36 | 35 | 34 |
| 12 | 44 | 43 | 42 | 41 | 40 | 39 | 38 | 37 | 36 | 35 | 34 | 33 | 32 |
| 11 | 42 | 41 | 40 | 39 | 38 | 37 | 36 | 35 | 34 | 33 | 32 | 31 | 30 |
| 10 | 40 | 39 | 38 | 37 | 36 | 35 | 34 | 33 | 32 | 31 | 30 | 29 | 28 |

# REFERENCES

Adkins, D. C. & Ballif, B. L. Exploration of motivation to achieve in preschool children. University of Hawaii Head Start Evaluation and Research Center Annual Report, 1966-67. Submitted to the Institute for Educational Development for the Research and Evaluation Division, Project Head Start, Office of Economic Opportunity.

Adkins, D. C. & Ballif, B. L. Measurement of motivation to achieve in preschool children. Final Report on Contract No. OEO 4218. Submitted to the Office of Economic Opportunity, 1968.

Anastasi, A. _Psychological testing_. New York: Macmillan, 1954.

Argyle, M. & Robinson, P. Two origins of achievement motivation. _British Journal of Social and Clinical Psychology_, 1962, 1, 107-120.

Atkinson, J. W. Explorations using imaginative thought to assess the strength of human motives. In M. R. Jones (Ed.), _The Nebraska symposium on motivation_. Lincoln: University of Nebraska Press, 1954.

Atkinson, J. W. Motivational determinants of risk-taking behavior. _Psychological Review_, 1957, 64, 359-372.

Atkinson, J. W. The mainsprings of achievement-oriented activity. In J. D. Krumboltz (Ed.), _Learning and the educational process_. Chicago: Rand McNally, 1965. Pp. 25-66.

Bandura, A. Social learning through imitation. In M. R. Jones (Ed.), _Nebraska symposium on motivation 1962_. Lincoln: University of Nebraska Press, 1962. Pp. 211-268.

Bandura, A., Grusec, J. E., & Menlove, F. L. Some social determinants of self-monitoring reinforcement systems. _Journal of Personality and Social Psychology_, 1967, 5, 449-455.

Bandura, A. & Kupers, C. J. Transmission of self-reinforcement through modeling. _Journal of Abnormal and Social Psychology_, 1964, 69, 1-9.

Bandura, A. & Whalen, C. K. The influence of antecedent reinforcement and divergent modeling cues on patterns of self-reward. _Journal of Personality and Social Psychology_, 1966, 3, 373-382.

Barlow, J. A. & Burt, C. The identification of factors from different experiments. _British Journal of Statistical Psychology_, 1954, 7, 52-56.

Berkowitz, H. & Zigler, E. Effects of preliminary positive and negative interactions and delay conditions on children's responsiveness to social reinforcement. _Journal of Personality and Social Psychology_, 1965, 2, 500-505.

Bloxom, B. Factorial rotation to simple structure and maximum similarity. *Psychometrika*, 1968, 33, 237-247.

Brim, O. G., Jr. Personality development as role learning. In I. Iscoe & H. W. Stevenson (Eds.), *Personality development in children*. Austin: University of Texas Press, 1960. Pp. 127-159.

Brookover, W. B., Erickson, E. L., & Joiner, L. M. Self-concept and student role achievement. Paper presented at American Educational Research Association Meetings, Los Angeles, February 1969.

Bryan, J. F. & Locke, E. A. Goal setting as a means of increasing motivation. *Journal of Applied Psychology*, 1967, 51, 274-277.

Burt, C. *The factors of the mind*. New York: Macmillan, 1941.

Carroll, J. B. The effect of difficulty and chance success on correlations between items or between tests. *Psychometrika*, 1945, 10, 1-20.

Cattell, R. B., Balcar, K. R., Horn, J. L., & Nesselroade, J. R. Factor matching procedures: An improvement of the s index; with tables. *Educational and Psychological Measurement*, 1969, 29, 781-792.

Cofer, C. N. & Appley, M. H. *Motivation: Theory and research*. New York: Wiley, 1964.

Combs, A. W. & Soper, D. W. *The relationship of child perceptions to achievement and behavior in the early school years*. Gainesville, Florida: University of Florida, 1963.

Congor, A. J. Dimensional analyses of binary data: An appraisal of the MMPI. Project on Techniques for Investigation of Structure of Individual Differences in Psychological Phenomena. Department of Psychology, University of Illinois, Urbana, Illinois, 1968.

Coopersmith, S. Implications of studies on self-esteem for educational research and practice. Paper presented at American Educational Research Association Meetings, Los Angeles, February 1969.

Digman, J. M. *A test of a multiple-factor model of child personality*. Honolulu: University of Hawaii, 1965.

Dingman, H. F. The relation between coefficients of correlation and difficulty factors. *British Journal of Statistical Psychology*, 1958, 11, 13-17.

Doob, L. W. The behavior of attitudes. *Psychological Review*, 1947, 54, 135-156.

Dreyer, A. S. & Haupt, D. Self-evaluation in young children. *Journal of Genetic Psychology*, 1966, 108, 185-197.

Feld, S. C. & Lewis, J. The assessment of achievement anxieties in children. In C. P. Smith (Ed.), *Achievement-related motives in children*. New York: Russell Sage Foundation, 1969. Pp. 151-199.

Ferguson, G. A. The factorial interpretation of test difficulty. *Psychometrika*, 1941, 6, 323-330.

Flanders, J. P. A review of research on imitative behavior. *Psychological Bulletin*, 1968, 69, 316-337.

Gilbert, D. C. The young child's awareness of affect. *Child Development*, 1969, 40, 629-640.

Gordon, E. W. & Wilkerson, D. A. *Compensatory education for the disadvantaged*. New York: College Entrance Examination Board, 1968.

Gourlay, N. Difficulty factors arising from the use of tetrachoric correlations in factor analysis. *British Journal of Psychology*, 1951, Stat. Section 4, 65-76.

Gray, S. W. & Klaus, R. A. An experimental preschool program for culturally deprived children. *Child Development*, 1965, 36, 887-898.

Guilford, J. P. The difficulty of a test and its factor composition. *Psychometrika*, 1941, 6, 67-78.

Haber, R. N. Discrepancy from adaptation level as a source of affect. *Journal of Experimental Psychology*, 1958, 56, 370-375.

Hardy, K. R. An appetitional theory of sexual motivation. *Psychological Review*, 1964, 71, 1-18.

Hebb, D. O. *The organization of behavior*. New York: Wiley, 1949.

Helson, H. Adaptation level as frame of reference for prediction of psychological data. *American Journal of Psychology*, 1947, 60, 1-29.

Henderson, R. W. Influences on cognitive and motivational conditions for acculturation. Paper read at American Educational Research Association Meetings, New York, February 1967.

Herbert, E. W., Gelfand, D. M., & Hartmann, D. P. Imitation and self-esteem as determinants of self-critical behavior. *Child Development*, 1969, 40, 421-430.

Hilgard, E. R. & Bower, G. H. *Theories of learning*. New York: Appleton-Century-Crofts, 1968.

Hunt, J. McV. The role of experience in the development of intelligence. Invited address for Psi Chi, at Midwestern Psychological Association Meetings, Chicago, May 1967.

Kagan, J. Motivational and attitudinal factors in receptivity to learning. In J. Bruner (Ed.), Learning about learning. Washington, D. C.: U. S. Government, 1966.

Kaiser, H. F. The application of electronic computers to factor analysis. Educational and Psychological Measurement, 1960, 20, 141-151.

Katz, I. The socialization of academic motivation in minority group children. In D. Levine (Ed.), Nebraska symposium on motivation 1967. Lincoln: University of Nebraska Press, 1967. Pp. 133-191.

Kohlberg, L. Development of moral character and ideology. In M. L. Hoffman (Ed.), Review of child development research, Vol. 1. New York: Russell Sage Foundation, 1964.

Liebert, R. M. & Allen, M. K. The effects of rule structure and reward magnitude on the acquisition and adoption of self-reward criteria. Psychological Reports, 1967, 21, 445-452.

Liebert, R. M. & Ora, J. P., Jr. Children's adoption of self-reward patterns: Incentive level and method of transmission. Child Development, 1968, 39, 537-544.

Malzman, I. Thinking: From a behavioristic point of view. Psychological Review, 1955, 62, 275-286.

Martine, J. G. Relationship between the self concept and differences in the strength and generality of achievement motivation. Journal of Personality and Social Psychology, 1956, 24, 364-375.

Mattick, I. Adaptation of nursery school techniques to deprived children. Journal of the Academy of Child Psychiatry, 1965, 4, 670-700.

McClelland, D. C. Personality. New York: Sloane, 1951.

McClelland, D. C. Methods of measuring human motivation. In J. W. Atkinson (Ed.), Motives in fantasy, action, and society. New York: D. Van Nostrand, 1958. Pp. 7-42.

McClelland, D. C. Toward a theory of motive acquisition. American Psychologist, 1965, 20, 321-333.

McClelland, D. C., Atkinson, J. W., Clark, R. A., & Lowell, E. L. The achievement motive. New York: Appleton-Century-Crofts, 1953.

McCoy, N. & Zigler, E. Social reinforcer effectiveness as a function of the relationship between child and adult. Journal of Abnormal and Social Psychology, 1965, 1, 604-612.

Miller, N. E. Comments on theoretical models illustrated by the development of a theory of conflict behavior. Journal of Personality and Social Psychology, 1951, 20, 82-100.

Mischel, W. & Liebert, R. M. Effects of discrepancies between observed and imposed reward criteria on their acquisition and transmission. Journal of Personality and Social Psychology, 1966, 3, 45-53.

Ofstad, N. S. The transmission of self-reinforcement patterns through imitation of sex-role appropriate behavior. Unpublished doctoral dissertation, University of Utah, 1960.

Olds, J. Physiological mechanisms of reward. In M. R. Jones (Ed.), The Nebraska symposium on motivation. Lincoln: University of Nebraska Press, 1955.

Pederson, D. M. Ego strength and discrepancy between conscious and unconscious self-concepts. Perceptual and Motor Skills, 1965, 20, 691-692.

Rasey, M. I. & Menge, J. W. What we learn from children. New York: Harper & Brothers, 1956.

Raynor, J. O. The functional significance of future goals. Ann Arbor: The University of Michigan, 1967.

Sarason, S. B. et al. Anxiety in elementary school children: A report of research. New York: Wiley, 1960.

Savitsky, C. Reaching the disadvantaged. In E. P. Torrance & R. D. Strom (Eds.), Mental health and achievement. New York: Wiley, 1965.

Sears, P. Attitudinal and affective factors in children's approaches to problem-solving. In J. Bruner (Ed.), Learning about learning. Washington, D. C.: U. S. Government, 1966. Pp. 28-33.

Smith, L. Significant differences between high ability achieving and non-achieving college freshmen as revealed by interview data. Journal of Educational Research, 1965, 59, 10-12.

Staats, A. W., Staats, C. K., & Heard, W. G. Attitude development and ratio of reinforcement. Sociometry, 1960, 23, 338-350.

Todd, F. G., Terrell, C., & Frank, C. E. Differences between normal and underachievers of superior ability. Journal of Applied Psychology, 1962, 46, 183-190.

Torrance, E. P. Motivating children with school problems. In E. P. Torrance & R. D. Strom (Eds.), Mental health and achievement. New York: Wiley, 1965.

Veroff, J. Social comparison and the development of achievement motivation. In C. P. Smith (Ed.), Achievement-related motives in children. New York: Russell Sage Foundation, 1969. Pp. 46-101.

Wrigley, C. & Neuhaus, J. E. The matching of two sets of factors. (Abstract of a paper presented at the 63rd annual convention of the American Psychological Association, September 1-7, 1955) American Psychologist, 1955, 10, 418-449.

Young, P. T. The role of hedonic processes in motivation. In M. R. Jones (Ed.), The Nebraska symposium on motivation. Lincoln: University of Nebraska Press, 1955.

Young, P. T. The role of affective processes in learning and motivation. Psychological Review, 1959, 66, 104-125.

Zigler, E. & Butterfield, E. C. Motivational aspects of changes in IQ test performance of culturally deprived nursery school children. Child Development, 1968, 39, 1-14.